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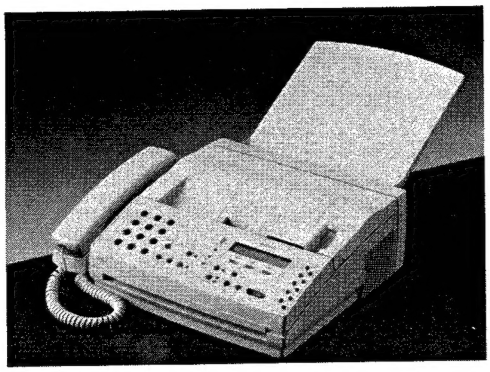
TeleFax

Service
Service
Service



PFC15/02/03/08/09
PFC25/02/03/08/09
PFC35/02/03/08/09
PFC45/02/03/08/09

Service Manual

PFC15 The PFC15 is a fax with features according to the group 3 standard. It includes a 5 sheet document feeder. The PFC15 needs an external telephone to establish calls. The machine has a built in fax switch which also allows connection of a Telephone Answer Device (TAD). Programming the user functions can be done via the programming sheet.

PFC25 The PFC25 is a PFC15 with a built-in telephone. The PFC25 also offers on hook dialling. The fax switch offers an extra mode to the PFC15 version. In this mode (the automatic mode) the fax switch picks up the line and checks for a fax tone or a voice conversation. In case a fax tone is detected the fax will answer the line. In the other case (a telephone call) the internal telephone will ring while a prerecorded voice will inform the caller to wait. The programming sheet must be used to program the users functions.

PFC35 The PFC35 is a fax machine with a built in telephone and a fax switch (like PFC25). Dialling can be preformed manually (via handset) or automatically. The LCD indicates the time and it is used to enter the users functions.

PFC45 The PFC45 is a PFC35 including a automatic paper cutter with de-curler.

Mechanically the PFC15, PFC25 PFC35 and PFC45 are equal.

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PHILIPS

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CONTENTS

4. SERVICE TABLES

5. REMOVAL AND ADJUSTMENT

6. TROUBLESHOOTING

7. ELECTRICAL DATA

8. PARTS CATALOG

9. DIAGRAMS

APPENDIX:

1. INTRODUCTION

1-1. General Specifications

Item	Data
Type	Desktop transceiver
Telephone Circuit	PSTN/PABX
Document Size	Width: 148 - 218 mm Length: 105 - 600 mm Thickness: 0.05 - 0.15 mm
Scanning Method	Flat bed, CCD
Scanning Width	216 +/- 1 mm
Effective Printing Width	210 mm (minimum)
Scan Resolution	Standard: 8 x 3.85 dots/mm Detail: 8 x 7.7 dots/mm Semi Superfine: 8 x 15.4 dots/mm
Transmission Time	15 sec. (Measured using a CCITT #1 test chart, Slerexe Letter, at 9,600 bps, MH coding with EFC, 10 msec./line I/O rate, standard resolution)
Data Compression Method	MH, EFC, SSC, MR*, (* PFC35, PFC45 only)
Modulation Method	V29, V27ter, V21
Transmission Data Rate	9600/7200/4800/2400 bps (Automatic fallback)
Protocol	CCITT T.30 standard (NET 30)
Printing Method	Thermal printing
Printer Paper Size	216 mm x 50 m roll
Dimensions	280 x 290 x 109 mm (PFC15), 351 x 298 x 109 mm
Weight	4.8 kg
Input Power Voltage	220 - 240 Vac, single phase
Recommended Operating Environment	Temparature: 17 - 28 deg C Humidity: 30 - 80 %RH

1-2. Features List

Features	PFC15	PFC25	PFC35	PFC45
Transmission				
Automatic transmission	no	no	yes	yes
Manual transmission	yes	yes	yes	yes
ADF capacity	5	5	5	5
Automatic Contrast Control	yes	yes	yes	yes
Polling transmission	no	no	yes	yes
Send later	no	no	yes	yes
Dial via dialpad	no	yes	yes	yes
Speed dial	no	no	10	10
Short dial	no	no	40	40
Automatic redial	no	no	yes	yes
Manual redial	no	no	yes	yes
Label programming for Speed/Short dials	no	no	yes	yes
Page indicator CSI + P.1	yes	yes	yes	yes
Page indicator TTI + P.1 or P.1/10	no	no	yes	yes
Reception				
Automatic reception	yes	yes	yes	yes
Manual reception	yes	yes	yes	yes
Polled reception	yes (copy/poll)	yes (copy/poll)	yes	yes
Automatic cutter	no	no	no	yes
Manual cutter	yes	yes	yes	no
Authorized reception (with TSI)	no	no	yes	yes
Decurler	no	no	no	yes
Printing of the TSI on received copies (Germany)	yes	yes	no	no
Communication				
TTI (page header with name) .	no	no	yes	yes
RTI (own phone number or text)	no	no	no	no
CSI (own phone number)	yes	yes	yes	yes
Counters (user function)	no	no	no	no
Voice request	no	no	no	no
PD/DTMF change by switch	no	yes	yes	yes
Modified read (MR)	no	no	yes	yes
Compatibility				
CCITT group 3	yes	yes	yes	yes
Copy quality				
Halftone (16 level) with image/text separation	yes	yes	yes	yes
Auto shading	yes	yes	yes	yes
MTF	yes	yes	yes	yes
8 x 15.4 lines/mm	yes	yes	yes	yes
Automatic contrast (threshold) control	yes	yes	yes	yes
Reports				
Transaction confirmation report (Journal)	no	no	yes	yes
Transmission report	yes	yes	yes	yes
Speed dial list	no	no	yes	yes
Short dial list	no	no	yes	yes
Error report	yes	yes	yes	yes
Unauthorized reception report	no	no	yes	yes
Telephone features				
Built-in handset	no	yes	yes	yes

Features	PFC15	PFC25	PFC35	PFC45
On-hook dial	no	yes	yes	yes
Monitor speaker	no	yes	yes	yes
Music on hold	no	no	no	no
Speakerphone	no	no	no	no
Al-redial (last 5 numbers)	no	no	yes	yes
12 key dialpad	no	yes	yes	yes
Volume control for speaker	no	yes	yes	yes
Volume control for ringer	no	yes	yes	yes
Power down function (Ring, Dial, Speech)	no	yes	yes	yes
FAX/PHONE switch				
Auto receive/manual receive switch	yes	yes	yes	yes
Auto answer delay time adjustment *	yes	yes	yes	yes
Automatic fax/tel switch	yes	yes	yes	yes
Speech generation (AVM)	no	yes	yes	yes
Interfaces				
Answering machine interface	yes	yes	yes	yes
PC interface	yes	yes	yes	yes
Others				
Copy mode (normal, fine, superfine, photo)	yes	yes	yes	yes
Time indicator	no	no	yes	yes
Clock adjustment	no	no	yes	yes
LCD display prompt	no	no	yes	yes
LCD size	no	no	2 x 20	2 x 20
Battery backed-up RAM size in kbytes	8	8	32	32
Service features				
Remote diagnostics	yes	yes	yes	yes
Printer test pattern	yes	yes	yes	yes
Bit switch setting	yes	yes	yes	yes
ROM/RAM data display/list	yes	yes	yes	yes
NCU parameter setting	yes	yes	yes	yes
Pulse width setting	no	no	no	no
Service report (last 10 errors)	yes	yes	yes	yes
Service counters	no	no	yes	yes

* Via programming sheet (PFC15, PFC25) or via user function (PFC35, PFC45), in TAM mode only.

1-3. Detailed Features Description

1-3-1. Auto Receive Mode

There are three reception modes, AUTO, TAM and FAX modes, which can be programmed in the Auto Receive key on the operation panel by the function 04 "SET FAX SWITCH" (PFC35, PFC45) or by the programming sheet (PFC15, PFC25).
For the PFC15 only two reception modes are available, the TAM mode and the FAX mode.
The Auto mode (not for PFC15) allows the machine to capture the line without any rings being heard by the users. Then, the machine starts to detect CNG for about 30 s sending back ring-back tones and AVM (Artifical Voice Message) in one or two languages selected by the user. After that, it calls the user by ringing from the speaker.
The TAM mode allows connection to telephone answering machines (TAM) connected on the same line. There are two types of TAM interface software used depending on the connection between the machine and a telephone answering machine.
The first type of TAM interface is used in the countries where the TAM is connected to the machine as an external device. When the external device captures the line, the machine detects DC current at the LIU. Then, the machine starts listening to the line for about 30 s. If the machine detects a or two CNG or the period of silence, the machine will capture the line and send CED/NSF/DIS to receive a fax message.
The second type of TAM interface is prepared for the countries (e.g., Germany) where the machine is connected to the TAM as an external device. In this case, the machine cannot detect DC current when the TAM goes off-hook. So, when the ringing signal disappears at the programmed number of rings, the machine starts listening the line. If the machine detects a or two CNG, the machine will capture the line and send CED/NSF/DIS to receive a fax message. With the second type of TAM interface, the machine cannot receive fax messages from the facsimiles which do not send a CNG.
The FAX mode allows the machine to receive all calls to receive fax messages.

1-3-2. Authorized Reception (PFC35 and PFC45 only)

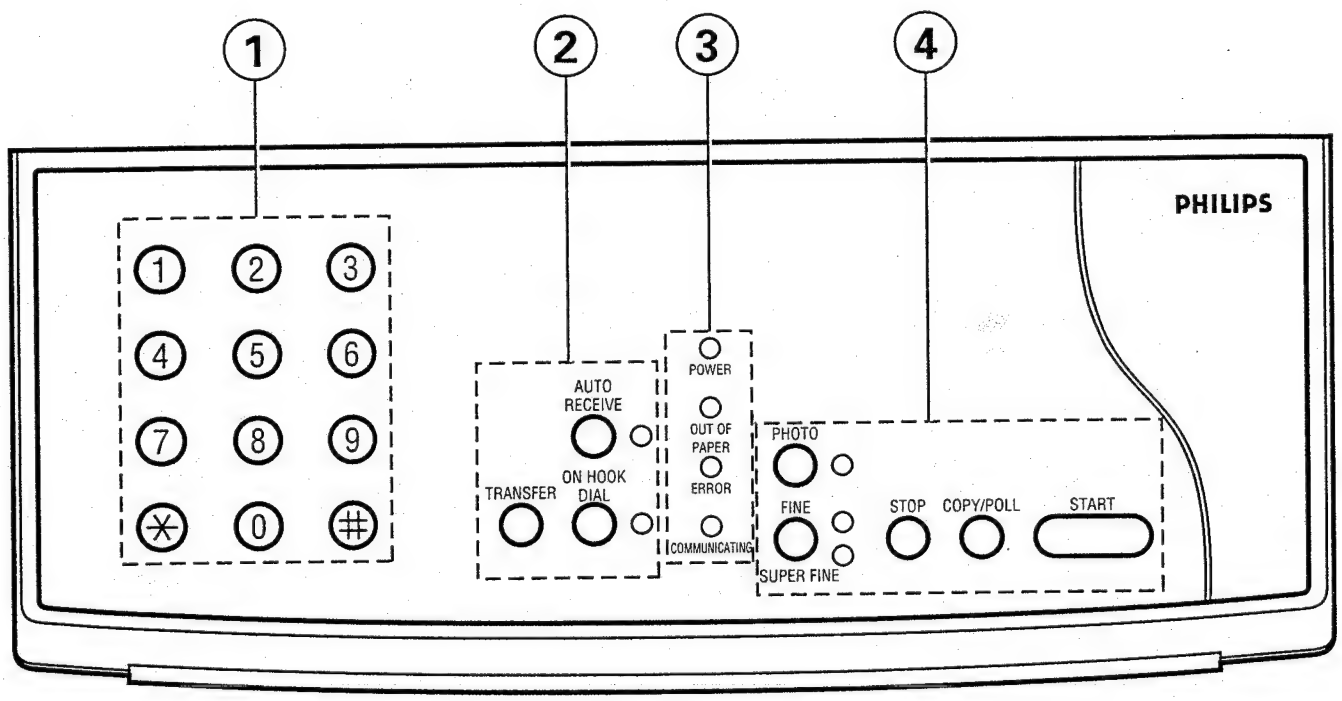
The machine automatically memorizes the TSI from the terminals programmed in the Speed Dials and Short Dials in the RAM, once the user sends a document to these terminals. Then, if Authorized Reception is switched on, the machine compares the TSI from the remote terminal with these TSIs memorized in the RAM, when the machine receives a fax call from any terminal. So, Authorized Reception prevents reception from terminals which are not programmed in the Speed/Short Dials.
If an unauthorised sender sends a fax message while this feature is switched on, the machine rejects the call and notify the users by printing a rejection report with the unauthorised sender's TSI.

1-3-3. Automatic Tx Speed Updating (AI dial PFC35, PFC45 only)

The machine memorises last 5 modem speed histories to each destinations programmed in the Speed/Short dials and the Forwarding terminal. Then, the machine chooses the most appropriate modem speed from the history record for the next transmission, in order to reduce the time for modem shift-down (approx. 5 s).
This feature works only when the machine has more than 2 modem speed records. The modem speed is recorded in the memory if there are no error pages during transmission.
This feature can work with the other manufacture's terminal.

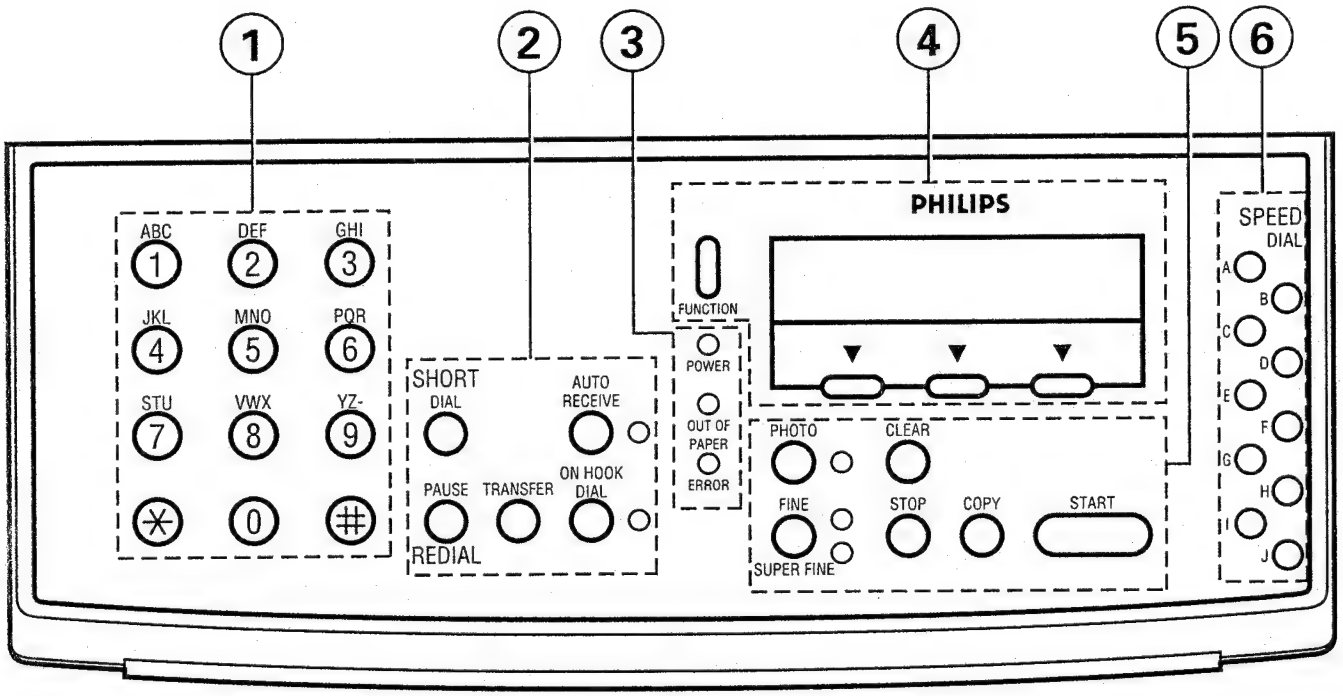
1-4. Operational Panels

1-4-1. Operation Panel PFC15 and PFC25



No.	Name	Function
1	Numeric keypad (PFC25 only)	Use the numeric keypad to dial
2	Transfer key (PFC25 only) Auto receive key and indicator On hook dial key and indicator (PFC25 only)	Press this key to access PSTN from behind the PABX, which requires Time break or Earth break method. The setting of Time break or Earth break can be changed by the slide switch on the back of the machine. If the indicator is off the manual receive mode is selected. If the indicator is on, the TAM mode, Fax mode or Auto mode (not for PFC15) is selected, depending on the setting of the programming sheet. Press this key to dial without picking up the handset.
3	Power indicator Out of paper indicator Error indicator Communicating indicator	Lights when the power is switched on. Lights when the paper has been used up. ghts when the machine has a problem. Blinks during fax communication.
4	Photo key and indicator Fine/Super Fine key and indicators. Stop key Copy/Poll key Start key	Press this key when you wish to send a document with gray levels. Press this key to change the resolution. If both indicators are off, Standard resolution is selected. Press this key to stop the machine and return it to standby mode. Press this key to copy the document which is in the feeder, or press this key to poll a station after dialling the number. Press this key to start sending or receiving a fax message.

1-4-2. Operation Panel PFC35 and PFC45



No.	Name	Function
1	Numeric keypad	Use the numeric keypad to dial
2	Short dial key	Press this key to change the mode of the numeric keypad and enter the two digit short dial code.
	Pause/Redial key	Press this key to insert a pause when dialling or programming a number, or use this key to redial the last 5 numbers that were used.
	Transfer key	Press this key to access PSTN from behind the PABX, which requires Time break or Earth break method. The setting of Time break or Earth break can be changed by the slide switch on the back of the machine.
	Auto receive key and indicator	If the indicator is off the manual receive mode is is selected. If the indicator is on, the TAM mode, Fax mode or Auto mode is selected, depending on the setting of function 04.
	On hook dial key and indicator	Press this key to dial without picking up the handset.
3	Power indicator	Lights when the power is switched on.
	Out of paper indicator	Lights when the paper has been used up.
	Error indicator	Lights when the machine has a problem.
4	Function key	Press this key to use one of the numbered functions. After pressing this key enter a two digit function number.
	Soft keys	The function of the three keys below the LCD corresponds with the text in the second row of the LCD.

No.	Name	Function
5	Photo key and indicator	Press this key when you wish to send a document with gray levels.
	Fine/Super Fine key and indicators.	Press this key to change the resolution. If both indicators are off, Standard resolution is selected.
	Clear key	This key deletes one digit if entered from the keypad or the entire number if a speed dial or short dial number has been chosen.
	Stop key	Press this key to stop the machine and return it to standby mode.
	Copy key	Press this key to copy the document which is in the feeder.
	Start key	Press this key to start sending or receiving a fax message.
6	Speed dial keys (A..J)	Pressing one of the speed dial keys results in dialling a preprogrammed fax number.

2-2. SERVICE LEVEL OPERATION

2-2-1. Entering and Exiting Service Mode

ENTERING SERVICE MODE

Press Start → Stop → Start → Stop → Start sequentially within 3 seconds.

The machine enters the service mode, then the main menu is printed.

```
SERVICE MODE:
TO SELECT AN ITEM PRESS "COPY" N-TIMES THEN "START", EXIT WITH "STOP"
1:TEST HARDWARE 2:PRINT REPORTS 3:CHANGE SETTINGS 4:PR. SHEET 5:RD SHEET
```

To enter "Check Hardware" mode, press Copy once, then press Start. The machine prints the "Hardware Test" menu.

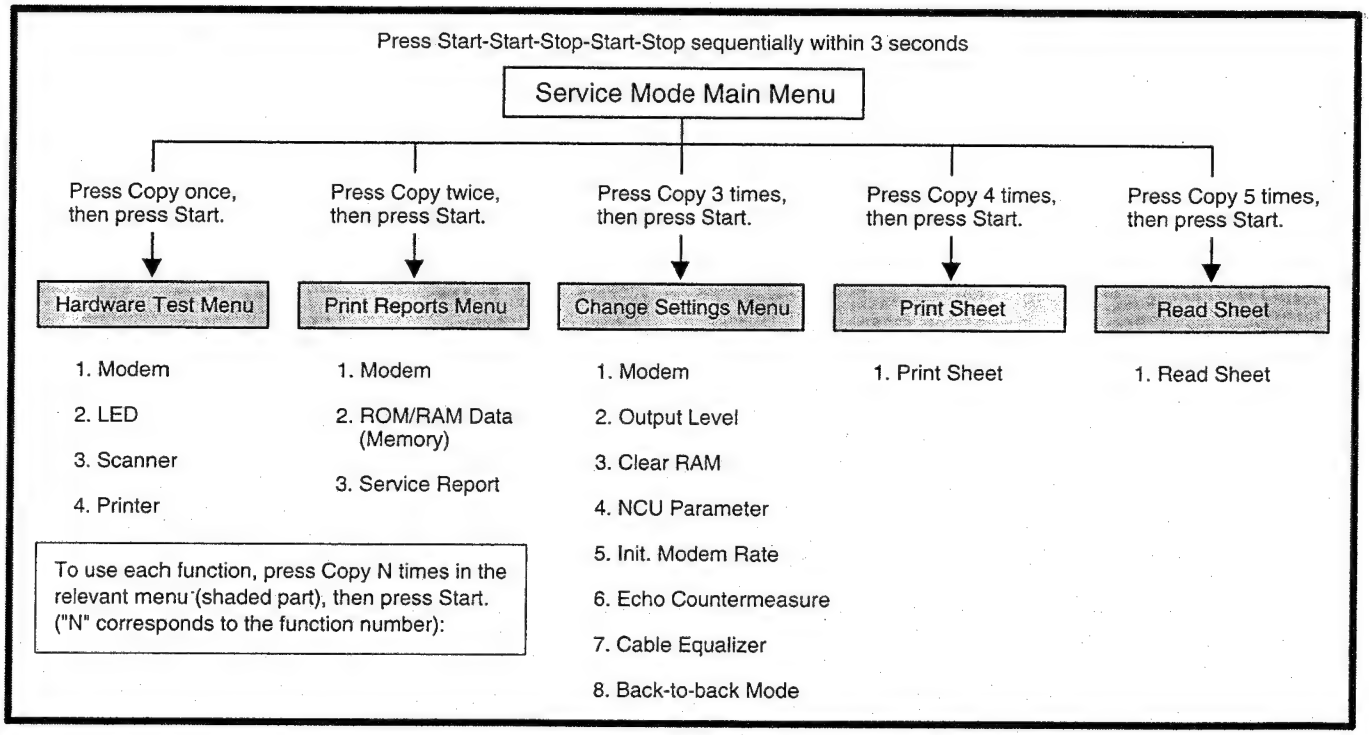
```
HARDWARE TEST:
1:MODEM  2:LED  3:SCANNER  4:PRINTER
```

To enter "Print Reports" mode, press Copy twice, then press Start. The machine prints the "Print Reports" menu.

```
PRINT REPORTS:
1:SYS REPORT  2:MEMORY  3:SERVICE REPORT
```

To enter "Change Settings" mode, press Copy 3 times, then press Start. The machine prints the "Change Settings" menu.

```
CHANGE SETTINGS:
1:BITSWITCH  2:OUTPUT LEVEL  3:CLEAR RAM  4:NCU PAR
5:INIT RATE  6:ECHO  7:CABLE EQUALIZER 8:BACK-TO-BACK MODE
```



EXITING SERVICE MODE

Press Stop in the service mode main menu.

2-2-2. Check Hardware

```
HARDWARE TEST:
1:MODEM  2:LED  3:SCANNER  4:PRINTER
```

1. Modem Test

To enter modem test mode in, "Hardware Test" mode press Copy once, then press Start. The "Modem test" menu will be printed.

```
MODEM FREQUENCY TEST:
1:NONE  2:9600  3:7200  4:4800  5:2400  6:300  7:1100  8:2100
```

To test a modem signal, press Copy n times then press Start, (e.g., press Copy 3 times for a 4800 bps signal). The modem test continues until you press Stop. Then you can change the frequency by pressing Copy or Start.

2. LED Test

To enter the LED test mode, enter the "Hardware Test" menu press Copy twice, then press Start. All LEDS on the operation panel will blink sequencially until you press Stop.

3. Scanner Test

To enter the Scanner test mode, enter the "Hardware Test" menu press Copy 3 times, then press Start. The LED array is switched on until you press Stop.

4. Printer Test

To enter the printer test mode, enter the "Hardware Test" mode press Copy 4 times , then press Start. The machine prints the test pattern.

2-2-3. Print Reports

```
PRINT REPORTS:
1:SYS REPORT  2:MEMORY  3:SERVICE REPORT
```

1. System Report

To print the system report, enter the "Print Reports" mode, press Copy once then press Start. The system report contains the ROM version and date, country code, CCITT/Maker codes, Tx/Rx counters, print counter, output level, bit switch settings, and NCU parameters.

2. ROM/RAM (Memory) data printout

To print ROM/RAM data, enter the "Print Reports" mode press Copy twice, then press Start. The following message will be printed.

```
PRINT MEMORY - ENTER FIRST 8 ADDRESS BITS: COPY=0 START=1
```

Then enter the first 8 bits of the address (the upper byte of the address in binary code) using the Copy (0) and Start (1) keys, and press Start. (e.g., if the address is 2EF6(H), enter 00101110 = 2E(H) = C-C-S-C-S-S-S-C: C=Copy, S=Start).
After pressing Start, the machine prints 100(H) bytes of data from the entered address (in the example, data will be printed from 2E00(H) to 2EFF(H)).
After printing the data, the following message will be printed:

```
COPY:PREVIOUS  START:NEXT
```

If you press Copy, the data in the preceding 100(H) range will be printed.
If you press Start, the data in the next 100(H) range will be printed.

3. Service Report

To print the service report, enter the "Print Reports" mode press Copy 3 times, then press Start.
The service report contains the last 5 error communication records and the last 10 error codes.

2-2-4. Change Settings

```
CHANGE SETTINGS:
1:BITSWITCH  2:OUTPUT LEVEL  3:CLEAR RAM 4:NCU PAR
5:INIT RATE  6:ECHO  7:CABLE EQUALIZER  8:BACK-TO-BACK MODE
```

1. Bit switch programming

To enter this mode, enter the "Change Settings" mode then press Copy once. The entry menu will be printed.

```
BIT SWITCH 0:00000000/00 1:00000000/00 2:00000000/00
SET BITSWITCH - ENTER 2 ADDRESS BITS: COPY=0 START=1
```

The upper line of the menu shows the current settings of the bit switches.
If you want to change the setting of a bit switch, enter the bit switch number in 2 bits binary code (e.g., press Copy (0) then Start (1) for bit switch 1), then press Start. The selected bit switch setting will be printed.

```
BIT SWITCH-1:00000000 ENTER 8 DATA BITS: COPY=0 START=1
```

Then enter new settings using Copy and Start keys. (e.g., 11110000 = S-S-S-S-C-C-C-C) Refer to section 4-1 for the bit switch definitions.

```
BIT SWITCH-1 SET: 11110000 DEFAULT: 00000000
```

After printing the new setting, the machine returns to the bit switch entry menu.

2. Tx level adjustment

To enter this mode, enter the "Change Settings" menu press Copy twice, then press Start. The entry menu will be printed.

```
OUTPUTLEVEL: -9
SET THE OUTPUT LEVEL IN -N DBM: ENTER 4 DATA BITS: COPY=0 START=1
```

Enter the new tx level (e.g., for -6 dBm, enter 0110 = C-S-S-C)

```
OUTPUT LEVEL SET -6 DBM  DEFAULT: -9 DBM
```

After printing the new setting, the machine returns to the "Change Settings" entry menu, then press Start.

3. RAM clear

To enter this mode, enter the "Change Settings" menu press Copy 3 times , then press Start. The following instruction will be printed.

```
TO CLEAR RAM PRESS START
```

Press Start to erase the RAM data. After the RAM has been all reset to the factory settings or if you pressed any other key than start in this step, the machine will return to the "Change Settings" entry menu.

4. NCU parameter programming

To enter this mode, enter the "Change Settings" menu press Copy 4 times, then press Start. The entry menu will be printed.

```
NCU 0:00001111/0F 1:00110001/31 2:00000001/01 ------------------ 5:00001111/0F
SET NCU PARAMETER : ENTER 3 ADDRESS BITS: COPY=0  START=1
```

The upper line of the menu shows the current parameter settings.
If you want to change the setting of a bit switch, enter the bit switch number in 3 bits binary code (e.g., press Copy (0), Copy (0), then Start (1) for NCU parameter 1), then press Start. The selected parameter setting will be printed.

```
FOR NCU-1:00110001 ENTER 8 DATA BITS: COPY=0 START=1
```

Then enter new settings using Copy and Start keys. (e.g., 01000000 = C-S-C-C-C-C-C-C for 40(H)) Refer to section 4-2-1 for the NCU parameter definitions.

```
NCU-1 SET: 01000000 DEFAULT: 00110001
```

After printing the new setting, the machine returns to the NCU parameter entry menu.

5. Initial Rx modem rate programming

To enter this mode, enter the "Change Settings" menu press Copy 4 times, then press Start. The following instruction will be printed.

```
SET INIT. MODEM RATE - 1:9600 2:4800
```

Select the required Rx modem rate by pressing Copy one or two times, then press Start.

```
INIT. MODEM RATE: 9600
```

Then the machine will return to the "Change Settings" menu.

6. Echo countermeasure (DIS detection times) programming

To enter this mode, enter the "Change Settings" menu press Copy 5 times, then press Start. The following instruction will be printed.

```
SET ECHO COUNTERMEASURE - 1:1X 2:2X
```

This Select the required setting by pressing Copy once(1x) or twice(2x), then press Start.

```
ECHO COUNTERMEASURE IS 2X
```

Then the machine will return to the "Change Settings" menu.

7. Rx Cable equalizer

To enter this mode, enter the "Change Settings" menu press Copy 6 times, then press Start. The following instruction will be printed.

```
SET CABLE EQUALIZER - 1: ON 2:OFF
```

Select the required setting by pressing Copy once, or twice times, then press Start.

```
CABLE EQUALIZER IS ON
```

Then the machine will return to the "Change Settings" menu.

8. Back-to-back mode

To enter this mode, enter the "Change Settings" menu press Copy 6 times, then press Start. The following instruction will be printed.

```
SET BACK-TO-BACK MODE - 1:ON 2:OFF
```

Select the required setting by pressing Copy one or two times, then press Start.

```
BACK-TO-BACK MODE IS ON
```

Then the machine will return to the "Change Settings" menu.

Note: When you normally work in Back-to-Back mode, first exit the Back-to-Back mode, before entering the service mode. Exit the Back-to-Back mode by:
1. Press Photo button (LED lights)
2. Press Photo and Start button together untill the LED is off.

2-2-5. Print sheet

The programming sheet is printed. For programming this sheet see section 2-1-1.

2-2-6. Read sheet

Before entering this mode, place the programming sheet face down in the ADF.
This mode reads the settings of the programming sheet.

2-2-7. Output level adjustment (hardware).

Use this function to adjust the output level of the LIU by means of resistor R374 on the FDU.
(Necessary after replacing the FDU).

1. Open the paper cover and remove the paper holder to get access to R374. Load the output of the LIU at connector P801, pin 3 (La) and pin 4 (Lb) with a 600 ohm resistor.
   Connect a millivoltmeter (accuracy better than 1%) over the 600 ohm resistor.
2. Switch the machine on and press Photo, Start and Stop at the same time to acces the hardware output level mode.
3. The modem outputs a 2100Hz signal of -9dBm. Adjust the output level of the LIU at -9.5 dBm +/- 0.1 dBm (259.5 mV +/-3mV) by means of R374.
4. After adjusting the output level, reassemble the fax.

3. PROGRAMMING, TESTING, AND PRINTING REPORTS - PFC35 and PFC45

3-1. USER LEVEL PROGRAMMING

Function List

No.	Function	Brief Explanation
01	Speed Dial Programming	Use to program a telephone number and a label in each Speed Dial key.
02	Short Dial Programming	Use to program a telephone number and a label in each Short Dial code.
03	Print Dial List	Use to print the telephone list, which contains Speed Dial and Short Dial numbers.
04	Set Fax Switch	Use to select the function of Auto Receive mode from among Auto mode, TAM mode and FAX mode.
05	Send Later	Use to program the machine to send a document at a later time.
06	Polling Send	Use to set up a document to be polled from a remote terminal.
07	Polling Receive	Use to program the machine to poll documents from remote terminals.
08	Activity Log Printing and On/Off	Use to print an Activity Log (Journal) and switch on/off listing communication record on the report.
09	Transmission Report On/Off	Use to switch automatic transmission report output on or off.
10	Page Header (TTI) On/Off	Use to switch the TTI printout on each transmitted page on or off.
11	Enter Page Header (TTI)	Use to program the TTI.
13	Enter Your Fax Number (CSI)	Use to program the CSI.
14	Time/Date	Use to adjust the date and time.
15	Set PABX/PSTN	Use to program the machine for the actual PABX type.
17	Key Touch Tone On/Off	Use to switch off or on the key touch tone.
18	RDS On/Off	Use to switch RDS on or off.
19	Set Language	Use to change the LCD and report language.
20	Authorized Reception On/Off	Use to prevent reception from terminals other than those programmed in the Speed/Short dials.

3-2. SERVICE LEVEL OPERATION

3-2-1. Entering and Exiting Service Mode

ENTERING SERVICE MODE

Press Start → Stop → Start → Stop → Start sequentially within 3 seconds.

After entering service mode, the following service functions are available.

No.	Function	Brief Explanation
Functions 30 to 38 are mainly prepared for factory use.		
30	RAM Test	Use to test the SRAM on the FCE.
31	Key Test	Use to test all keys on the operation panel.
32	LED Test	Use to test all LEDs on the operation panel.
33	LCD Test	Use to test the LCD on the operation panel.
34	Speaker Test	Use to test the monitor speaker.
35	Printer Test	Use to print a test pattern.
36	PTT Test	Use to test the modem signals, DTMF tones, and transmission level.
37	Frequency Test	Use to test the signals with desired frequency and level.
38	Burn-in Test	Do not use this function. If this function is used, the RAM will be all cleared.
The functions 40's and 90's are prepared for service.		
40	Factory Adjustment	Use to check the ROM version, to adjust tx level with the resistor R374 on the FDU, and to clear the RAM.
41	Not used	
42	Not used	
43	Bit Switch Programming	Use to change the bit switch settings.
44	Scanner Adjustment Mode	Use to switch on the LED array for scanner adjustment.
91	Display ROM/RAM Data	Use to display and change the ROM/RAM data.
92	Print System Report	Use to print the system report.
93	Print ROM/RAM Data	Use to print ROM/RAM data.
94	Not used	
95	Print Service Report	Use to print the service report.
96	Not used	
97	Not used	
98	NCU Parameter Programming	Use to adjust the NCU parameters.

EXITING SERVICE LEVEL

Press Stop, Function, or EXIT at any time.

The machine will exit service mode automatically 40s. after entrance.

Note: In the functions, the new settings will not be saved by pressing the Function key. To save the new settings, you have to press "SET", then exit the service mode.

3-2-2. RAM Test (Function 30)

1. Enter the service mode (see section 3-2-1).
2. Press Function, enter 30, then press SET.
3. The machine starts to check the SRAM without clearing any RAM data stored.
   If RAM test succeeded, the machine prints "RAM TEST OK", and goes to the Key Test.
   If RAM test failed, the machine displays "RAM ERROR AT ##AAAA" (## = type of RAM; AAAA = address) for 3 s, then "RAM TEST FAILED" is printed
   (Type of RAM: 09 = SRAM, 00 - DRAM0, 10 - DRAM1)

   After this test, the machine automatically goes into function 31.

3-2-3. Key Test (Function 31)

1. Enter the service mode (see section 3-2-1).
2. Press Function, enter 31, then press SET.
3. The display shows the name of a key. If the key is pressed the display shows the next one until the last key "J" is pressed.
   If the key test was successful, the machine prints "KEY TEST OK".
   If the key test was failed or aborted, the machine prints "KEY TEST FAILED.
   After this test, the machine automatically goes to the LED test.

Display	Key Tested	Display	Key Tested	Display	Key Tested
1 through #	Keys in the dial-pad	ONL	On Hook Dial	CLR	Clear
SHO	Short Dial	FUN	Function	FIN	Fine
		LEF	Softkey (Left)	STO	Stop
AUT	Auto Receive	MID	Softkey (Middle)	CPY	Copy
RED	Redial	RIG	Softkey (Right)	STA	Start
HOL	Transfer	PHO	Photo	A through J	Speed Dial keys

3-2-4. LED Test (Function 32)

1. Enter the service mode (see section 3-2-1).
2. Press Function, enter 32, then press SET.
3. All the LEDs on the operation panel blink sequentially until OK or ERROR is pressed.
   If OK is pressed, the machine prints "LED TEST OK" and goes to the LCD test.
   If ERROR is pressed, the machine prints "LED TEST FAILED", and goes to the LCD test.

3-2-5. LCD Test (Function 33)

1. Enter the service mode (see section 3-2-1).
2. Press Function, enter 33, then press SET.
3. The two lines on the LCD show a line of solid black characters alternatively until OK or ERROR is pressed.
   If OK is pressed, the machine prints "LCD TEST OK" and goes to the Speaker Test.
   If ERROR is pressed, the machine prints "LCD TEST FAILED", and goes to the Speaker Test.

3-2-6. Speaker Test (Function 34)

1. Enter the service mode (see section 3-2-1).
2. Press Function, enter 34, then press SET.
3. The machine emits a tone from the speaker until OK or ERROR is pressed. Press the ">" key to switch between two different volumes.
   If OK is pressed, the machine prints "VOL TEST OK" and goes to the Printer Test.
   If ERROR is pressed, the machine prints "VOL TEST FAILED" and goes to the Printer Test.

3-2-7. Printer Test (Function 35)

1. Enter the service mode (see section 3-2-1).
2. Press Function, enter 35, then press PRINT.
3. A test pattern with diagonal lines is printed. After printing, the machine goes to standby mode.

3-2-8. PTT Test (Function 36)

1. Enter the service mode (see section 3-2-1).
2. Press Function, enter 36, then press SET.
3. Press "MDM" for modem test, "DTMF" for DTMF test, or "LEV." for tx level adjustment.

4.1 Modem Test
The test starts from the silence (the machine only goes off-hook), then by pressing the # key the signal changes to 9,600bps - 7,200bps - 4,800bps - 2,400bps - 300bps - 600Hz - 1100Hz - 2100Hz. (Press the * key to go back to the previously selected signal.)
After you have finished the test, press EXIT to go back to step 3.

4.2 DTMF Test
Press a key on the dialpad (0 - 9, * and #) to test the DTMF signal.
After you have finished the test, press EXIT to go back to step 3.
Note: The continuous DTMF tone is available in "power down" mode, lift handset and hold down the requested dialpad key.

4.3 Tx Level Adjustment
The current tx level setting is displayed in the upper right corner of the LCD. To change the setting, press # to increment or press * to decrement. After adjustment, press EXIT to save the setting.

3-2-9. Frequency Test (Function 37)

1. Enter the service mode (see section 3-2-1).
2. Press Function, enter 37, then press SET.
3. The machine emits a sine wave of the displayed frequency. The frequency can be changed in units of 100Hz by pressing # (increment) or * (decrement). Also, the output level can be changed by pressing LEV.

3-2-10. Burn-in Test (Function 38)

Do not use this function.

3-2-11. Factory Adjust (Function 40)

1. Enter the service mode (see section 3-2-1).

2. Press Function, enter 40, then press SET.
   The upper line on the LCD shows the ROM version "VER x.xx dd.mm.yy c" (x.xx = version, dd.mm.yy = date, c = country setting). The lower line on the LCD shows "CLK 0.LEV RAMC".

3. Press CLK for clock oscillator adjustment, 0.LEV for fine tx level adjustment, and RAMC for RAM clear.

4.1 Clock Oscillator Adjustment
This function is not for service. The oscillator has been adjusted in the factory. However, if the clock does not work correctly, please check the frequency of the oscillator with this function. The frequency of the output from TP401 has to be at 16,384 (± 0.04) Hz. Adjust the frequency by means of C403 on the FCE.
Press Stop and reassemble the machine after you have completed the adjustment.

4.2 Tx Level Fine Adjustment
This function lets the machine output a 2,100Hz signal with a -9dBm output level.
Load the output of the LIU at connector P801, pin3 (la) and pin4 (lb) with a 600 ohm resistor. Connect a millivoltmeter (accuracy better than 1%) over the 600 ohm resistor. Switch the fax on. Then enter this mode and adjust the level at -9.5 (± 0.1) dBm (259.5 ± 3 mV) by means of R374.
Press Stop and reassemble the machine after you have completed the adjustment.

4.3 RAM Clear
RAM is all reset to the initial settings and the CPU is restarted.
WARNING: With this function, all the previous settings will be reset to the initial settings.

3-2-12. Bit Switch Programming (Function 43)

1. Enter the service mode (see section 3-2-1).

2. Press Function, enter 43, then press SET.

3. The setting of bit switch 0 is displayed.
   To change the setting of a bit, press the bit number on the dialpad (0 - 7). Press < or > to select other switches.

4. To store the new setting, press OK.

Note: For Back-to-Back mode (Bit switch 0, bit 7)
When you normally work in Back-to-Back mode, first exit the Back-to-Back mode, before entering the service mode. Exit the Back-to-Back mode by:
1. Press Photo button (LED lights)
2. Press Photo and Start button together untill the LED is off.

3-2-13. Scanner Adjustment (Function 44)

1. Enter the service mode (see section 3-2-1).

2. Press Function, enter 44, then press SET.

3. The LED array is switched on until "OK" is pressed. Refer to section 5-5-3 for more details on scanner adjustment.

3-2-14. Display and Rewrite ROM/RAM Data (Function 91)

1. Enter the service mode (see section 3-2-1).

2. Press Function, enter 91, then press SET.

3. The upper line on the LCD shows "ADD: aaaa VAL: ddd/hh" (aaaa = address, ddd = decimal value of the data, and hh = hexadecimal value of the data).

4. Select the address, where the data you want to display or change is stored, using keys 0 through 9 and Speed Dial keys A through F, or using * key to decrement the address and # key to increment the address.

5. Press EDIT, if you want to rewrite the data.
6. Rewrite the data in the hexadecimal data field. (The "<" and ">" keys are used to move the cursor in the data field.)
7. Press OK to save new data at the selected address.
8. Press Stop to exit this function or go back to step 3 to change another address.

3-2-15. System Report (Function 92)

1. Enter the service mode (see section 3-2-1).
2. Press Function, enter 92, then press PRINT. The system report will be printed.

3-2-16. Print ROM/RAM Data (Function 93)

1. Enter the service mode (see section 3-2-1).
2. Press Function, enter 93, then press SET.
3. Enter the start address then press OK.
   The address field has 5 digits, as the first digit is used for bank identification and the following 4 digits are for actual address. Enter bank 9 for RAM addresses above 4000H
4. Enter the end address then press OK. The machine prints a list of ROM/RAM data in the selected address range.

3-2-17. Service Report (Function 95)

1. Enter the service mode (see section 3-2-1).
2. Press Function, enter 95, then press PRINT. The service report will be printed.

3-2-18. NCU Parameter Programming (Function 98)

1. Enter the service mode (see section 3-2-1).
2. Press Function, enter 98, then press SET.
3. The upper line on the LCD shows "ADD: aa VAL: ddd/hh" (aa = parameter number, ddd = decimal value of the data, and hh = hexadecimal value of the data).
4. Select the required parameter number with the 0 through 9 keys, or press # or * to scroll through the parameters.
5. Press EDIT if you want to change the data.
6. Rewrite the data in the decimal data field. (The "<" and ">" keys are used to switch the cursor between the address and data fields, and the * and # keys are used to decrement/increment the data value.)

4. SERVICE TABLES

4-1. BIT SWITCHES

WARNING
Do not adjust a bit switch that is described as "Not used", as this may cause the machine to malfunction or to operate in a manner that is not accepted by local regulations.

Bit Switch 0

	FUNCTION	SETTINGS	COMMENTS
0	FTZ protocol	0: Disabled 1: Enabled	If this bit is 1, all of FTZ requirements are implemented in the protocol. This bit must be set to 1 in Germany.
1	Rx cable equalizer	0: Disabled 1: Enabled	Set this bit to 1, when there is a serious signal loss during reception at the higher frequency range. The cable equalizer will amplify the signal in this range by +3dBm.
2	DIS detections	0: Once 1: Twice	The machine will send DCS (G3 set-up signal) if it receives DIS. If echoes are frequent, setting this bit to 1 will allow the machine to wait for the second DIS before sending DCS.
3	TSI (RTI) printout on received copies	0: Disabled 1: Enabled	If this bit is 1, the TSI or RTI received from the sender will be printed on the top of each page.
4	Burst error threshold/ error line ratio	0: 6 (12) [24] lines/10% 1: 3 (6) [12] lines/5%	If there are more consecutive error lines in the received page than the threshold specified by this bit, the page is rejected. Values in parenthesis ( ) are for Fine resolution, and those in square brackets [ ] are for Super Fine resolution. Also, if the number of error lines divided by the total number of line reaches the value determined by this bit, the machine will send RTN to the other end. If you want to receive messages with less error lines, set this bit to 1.
5	Training error threshold	0: 4 bits 1: 1 bits	If the machine detects more errors during training than the number set by this bit, training fails and the machine will send FTT to ask the other terminal for modem rate shift-down. Set this bit to 1, if you want to receive the messages with more reliable modem speed.
6	Initial Rx modem rate	0: 9,600 bps 1: 4,800 bps	The setting of this bit is used to inform the sending machine of the initial starting modem rate for the machine in receive mode. If 9,600 bps presents a problem during reception, use 4,800 bps.
7	Back to back test	0: Disabled 1: Enabled	Set this bit to 1, when you want to test a back-to-back communication.

Bit Switch 1			
	FUNCTION	**SETTINGS**	**COMMENTS**
0	Not used		
1	Not used		
2	Not used		
3	Not used		
4	Not used		
5	Not used		
6	Remote read/write request **(PFC35/PFC45 only)**	0: Always enabled 1: User selectable	In the most of countries remote read/write request from the RDS system is always acceptable. After an RDS operation, the RDS will switch this bit to 1 to let the users select the RDS "on for 24 hours." or "off" from the next RDS operation.
7	Communication parameter display and line monitoring after handshaking **(Communication parameter is displayed only on PFC35/PFC45)**	0: Disabled 1: Enabled	This is a fault-finding aid. If this bit is set to 1, the LCD shows the key parameters (see below) and the speaker is enabled during message transmission and reception. This should be normally disabled because it cancels the CSI/TSI display for the user.

Modem rate (bps)	**Sub-scan resolution (lines/mm)**	**Coding**	**Width and reduction**	**Mode**	**I/O rate (ms/line)**
96: 9,600 72: 7,200 48: 4,800 24: 2,400	S: 3.85 D: 7.7 F: 15.4	1D: MH 2D: MR 1E: MH + EFC 2E: MR + EFC 1S: MH + SSC 2S: MR + SSC	A: A4 N: No reduction	DCS: CCITT G3 NSS: Non-standard G3	0M: 0 5M: 5 10M: 10 20M: 20 40M: 40

Bit Switch 2			
	FUNCTION	SETTINGS	COMMENTS
0	Not used		
1	Not used		
2	Not used		
3	Not used		
4	CSI programming	0: User level 1: Service level	1: The function 13 "Enter Your Fax Nr." only appears in service mode. (Austria only)
5	TAM interface type	0: Normal 1: German type	0: The normal type of TAM interface monitors the line current on the LIU, to detect whether the external TAM goes off-hook or on-hook. 1: The German type of TAM interface does not monitor the line current on the LIU, because the TAM and the fax are connected in parallel to the line. Refer to section 1-3-1 for more detail.
6	TAM (Telephone Answering machine) interface	0: Enabled 1: Disabled	If this bit is 1, TAM mode cannot be selected by the user with the function 04.
7	"CCT-FAX" insertion on transmitting pages **(Germany only)**	0: Enabled 1: Disabled	In Germany, "CCT-FAX" have to be printed on the top of each transmitting pages, because of PTT requirement.

4-2. USEFUL RAM ADDRESSES

In the equations that occur in the following tables, N represents the decimal value stored in the RAM address.

WARNING
Changing any RAM data that are not listed in this table may cause the machine to malfunction.

4-2-1. PFC15/PFC25

Use the "PRINT MEMORY" function to check the data in the RAM, or use RDS to check and change the RAM data listed below.

Address (Hex)	Function		
0000 - 0002	Bit switches 00 to 02 (0000 = Bit switch 00, 0001 = Bit switch 01, and so on); Refer to section 4-1 for details.		
0009	User function parameters Bit 7: Sent Fax Report Bit 6 through 0: Not used	(1: On)	
02E4	Received page counter (BCD)	High: Tens digit	Low: Units digit
02E5		High: Thousands digit	Low: Hundreds digit
02E6		High: Hundred thousands digit	Low: Ten thousands digit
02E7 - 02E9	Transmitted page counter	(Refer to the transmitted page counter)	
02EA	Printed page counter (BCD)	High: Tens digit	Low: Units digit
02EB		High: Thousands digit	Low: Hundreds digit
02EC		High: Hundred thousands digit	Low: Ten thousands digit
02ED - 02EF	Scanned page counter	(Refer to the scanned page counter)	

Address (Hex)	Function
03A1	Country code transfered from the LIU (Hex) 00: France 01: Germany 02: GB 03: Italy 04: Austria 05: Belgium 06: Denmark 07: Finland 08: Ireland 09: Norway 0A: Sweden 0B: Switzerland 0C: Portugal 0D: Netherlands 0E: Spain
0355 - 0357: Line current detection parameters	
0355	Line current detection time [Time = N x 10 (ms), detection disabled if N = FF]
0356	Line current reset time [Time = N x 20 (ms)]
0357	Line current dropout detection time [Time = N x 20 (ms)]
037A	CCITT T1 time [Time = N x 2.56 (s)]
037C	Minimum signal detection level [Level = 0 - N x 0.375 (dBm)]
037D - 0381: Ringing signal detection parameters	
037D	**NCU Parameter 00:** Acceptable ringing signal frequency, upper limit [Frequency = $1/(N \times 10^{-3})$ (Hz)]
037E	**NCU parameter 01:** Acceptable ringing signal frequency, lower limit [Frequency = $1/(N \times 10^{-3})$ (Hz)]
037F	**NCU parameter 02:** Number of rings until a call is detected [Number = N x 1]
0380	**NCU parameter 03:** Minimum required length of a ring [Length = 20 x N (ms)]
0381	**NCU parameter 04:** Minimum required length of a interval between rings [Length = 40 x N (ms)]
0382	**NCU parameter 10:** Modem transmission level [Level = - N (dBm)]
0383	Language selected for display and reports 0(D): English 1(D): German 2(D): Italian 3(D): French 4(D): Spanish 5(D): Swedish 6(D): Portuguese 7(D): French 8(D): Norwegian
038C	AVM language AVM ROM A 1(D): English 2(D): German 3(D): Dutch 4(D): French AVM ROM B 1(D): English 2(D): Swedish 3(D): Danish 4(D): Norwegian 5(D): Finnish AVM ROM C 1(D): English 2(D): Italian 3(D): Spanish 4(D): Portuguese
038D	Second AVM language (Same as above)
039D	Ringing time in Auto mode [Time = N (s)] The value N should be a multiple of 5 between 5 and 25, which can also be programmed with the programming sheet.
03A1 - 03A4: CNG detection parameters	
03A1	Maximum acceptable CNG OFF-time [Time = N x 20 (ms)]
03A2	Minimum acceptable CNG OFF-time [Time = N x 20 (ms)]
03A3	Maximum acceptable CNG ON-time [Time = N x 20 (ms)]
03A4	Minimum acceptable CNG ON-time [Time = N x 20 (ms)]
03B3	Mode selection in Auto Select mode Bit 3 2 1 0 Mode 0 0 0 1 Auto (Auto Tel/Fax Switch) mode with AVM (not for PFC15) 0 0 1 0 Auto (Auto Tel/Fax Switch) mode with ringback tone (not for PFC15) 0 0 1 1 TAM (Telephone Answering Machine) mode 0 1 0 0 FAX (Automatic receive) mode
03B7	Continuous silent period detection time in TAM mode [Time = N x 40 (ms)]
03B8	Number of rings until a call is detected in TAM mode [N (times)]
0700 - 0719	Sent Fax Report generation area (26 bytes x 1 communication); **See section 4-2-3**
071A - 07E6	Service report and error report generation area (41 bytes x 5 communications); **See section 4-2-4**
0F80 - 0F93	Error code memory (up to 10 codes x 2 bytes); **See section 4-2-5**
0F94	Number of characters in the CSI - 14 (H)
0F95 - 0FA8	CSI (ASCII)
1784	Paper end sensor threshold value - 09 (H) If the digitized sensor output is below 09(H), the mahchine detects paper end.

4-2-2. PFC35/PFC45

Use service function 91 to view or adjust the contents of a RAM address. See section 3-2-14 for details.

Address (Hex)	Function
0000 - 0002	Bit switches 00 to 02 (0000 = Bit switch 00, 0001 = Bit switch 01, and so on); Refer to section 4-1 for details.
0009	User function parameters Bit 7: Sent Fax Report On/Off [Function 09] (1: On) Bit 6: TTI (Page Header) On/Off [Function 10] (1: On) Bit 5: Key Touch Tone On/Off [Function 17] (1: On) Bit 4: RDS On/Off [Function 18] (1: On for 24 hours) Bit 3: AM/PM Indication on LCD clock (1: On) Bit 2: Not used Bit 1: Not used Bit 0: Not used
000A	User function parameters Bit 7: Communication record listing on Journal [Function 08] (1: On) Bit 6: Authorised Reception On/Off [Function 20] (1: On) Bit 5 through 0: Not used
0039	Exchanger type connected to the machine Bit 2 = 0: PSTN Bit 2 = 1: PABX
0300 - 0302: Line current detection parameters	
0300	Line current detection time [Time = N x 10 (ms), detection disabled if N = FF]
0301	Line current reset time [Time = N x 20 (ms)]
0302	Line current dropout detection time [Time = N x 20 (ms)]
0303 - 0320: PSTN tone detection parameters	
0303 - 030E	Modem data for PSTN dial tone frequency range (See section 4-2-6). 1st byte - amp (high) 2nd byte - amp (low) 3rd byte - a1 (high) 4th byte - a1 (low) 5th byte - b1 (high) 6th byte - b1 (low) 7th byte - au (high) 8th byte - au (low) 9th byte - bu (high) 10th byte - bu (low) 11th byte - hysteresis (high) 12th byte - hysteresis (low)
030F	PSTN dial tone detection time [Time = N x 20 (ms), detection disabled if N = FF]
0310	PSTN dial tone reset time [Time = N x 0.16 (s)]
0311	PSTN dial tone continuous tone time [Time = N x 20 (ms)]
0312	PSTN dial tone permissible dropout time [Time = N x 20 (ms)]
0313	PSTN pause time [Time = N x 0.16 (s)]
0314	PSTN ringback tone detection time [Time = N x 20 (ms), detection disabled if N = FF]
0315 - 0320	Modem data for PSTN busy tone frequency range. Caution: Do not adjust
0321 - 033E: PABX tone detection parameters	
0321 - 032C	Modem data for PABX dial tone frequency range. Caution: Do not adjust
032D	PABX dial tone detection time [Time = N x 20 (ms), detection disabled if N = FF]
032E	PABX dial tone reset time [Time = N x 0.16 (s)]
032F	PABX dial tone continuous tone time [Time = N x 20 (ms)]
0330	PABX dial tone permissible dropout time [Time = N x 20 (ms)]
0331	PABX pause time [Time = N x 0.16 (s)]
0332	PABX ringback tone detection time [Time = N x 20 (ms), detection disabled if N = FF]

Address (Hex)	Function
0333 - 033E	Modem data for PABX busy tone frequency range. Caution: Do not adjust
033F - 0348: Busy tone detection parameters	
033F	Busy tone ON time (range 1) [Time = N x 10 (ms)]
0340	Busy tone OFF time (range 1) [Time = N x 10 (ms)]
0341	Busy tone ON time (range 2) [Time = N x 10 (ms)]
0342	Busy tone OFF time (range 2) [Time = N x 10 (ms)]
0343	Busy tone ON time (range 3) [Time = N x 10 (ms)]
0344	Busy tone OFF time (range 3) [Time = N x 10 (ms)]
0345	Busy tone ON time (range 4) [Time = N x 10 (ms)]
0346	Busy tone OFF time (range 4) [Time = N x 10 (ms)]
0347	Continuous busy tone detection time [Time = N x 10 (ms)]
0348	Bits 0 to 3: Busy tone signal state time tolerance (for all ranges) Bit 3 2 1 0 Tolerance 0 0 0 1 ± 50% 0 0 1 0 ± 25% 0 0 1 1 ± 12.5% Bits 4 to 7: Number of cycles required for detection
0349 - 0359: International dial tone detection parameters	
0349 - 0354	Modem data for international dial tone frequency range. Caution: Do not adjust
0355	International dial tone detection time [Time = N x 20 (ms), detection disabled if N = FF]
0356	International dial tone reset time [Time = N x 0.16 (s)]
0357	International dial tone continuous tone time [Time = N x 20 (ms)]
0358	International dial tone permissible dropout time [Time = N x 20 (ms)]
0359	International dial pause time [Time = N x 0.16 (s)]
035A - 036A: National dial tone detection parameters	
035A - 0365	Modem data for domestic dial tone frequency range. Caution: Do not adjust
0366	National dial tone detection time [Time = N x 20 (ms), detection disabled if N = FF]
0367	National dial tone reset time [Time = N x 0.16 (s)]
0368	National dial tone continuous tone time [Time = N x 20 (ms)]
0369	National dial tone permissible dropout time [Time = N x 20 (ms)]
036A	National dial pause time [Time = N x 0.16 (s)]
036B - 036C	International dial access number Example: If the number is 100, store F1 in address 036B, and 00 in address 036C.
036D	PABX operator pause [Time = N x 20 (ms)]
036F	CCITT T1 time [Time = N x 2.56 (s)]
0370	Maximum number of dialling attempts to the same station in normal tx
0371	Redial interval in normal tx [Time = N (minutes)]
0373	Dial tone detection level [Level = 0 - N x 0.375 (dBm)]
0374	Busy tone detection level [Level = 0 - N x 0.375 (dBm)]
0375	Minimum signal detection level [Level = 0 - N x 0.375 (dBm)]
0376 - 037A: Ringing signal detection parameters **(Use function 98 to change)**	
0376	**NCU Parameter 00:** Acceptable ringing signal frequency, upper limit [Frequency = $1/(N \times 10^{-3})$ (Hz)]
0377	**NCU parameter 01:** Acceptable ringing signal frequency, lower limit [Frequency = $1/(N \times 10^{-3})$ (Hz)]
0378	**NCU parameter 02:** Number of rings until a call is detected [Number = N x 1]

Address (Hex)	Function
0379	**NCU parameter 03:** Minimum required length of a ring [Length = 20 x N (ms)]
037A	**NCU parameter 04:** Minimum required length of a interval between rings [Length = 40 x N (ms)]
	037B - 037C: Pulse dial parameters **(Use function 98 to change)**
037B	**NCU parameter 05:** Time between closing the dc loop and the first dialled digit [Time = N (ms)]
037C	**NCU parameter 06:** Pause between dialled digits (pulse dial mode) [Time = N x 20 (ms)]
037D	**NCU parameter 07:** Time waited when a pause is entered at the operation panel [Time = N x 20 (ms)]
	037E - 037F: Tone dial parameters **(Use function 98 to change)**
037E	**NCU parameter 08:** DTMF tone length [Time = N x 5 + 60 (ms)]
037F	**NCU parameter 09:** Time between dialled digits (DTMF dial mode) [Time = N x 5 + 60 (ms)]
0380	**NCU parameter 10:** Modem transmission level [Level = - N (dBm)]
0381	Language selected for LCD and reports: ROM Type 1 0(D): English 1(D): German 2(D): Dutch 3(D): Italian 4(D): Spanish 5(D): Swedish 6(D): Portugese 7(D): French 8(D): Norwegian ROM Type 2 0(D): English 1(D): German 2(D): Dutch 3(D): Swedisch 4(D): French 5(D): Norwegian 6(D): Finish 7(D): Danish
0386 - 0387	Intercity access code for France: 16(D) [0386 = FF(H), 0387 = 16(BCD)]
0399	Ringing time in Auto mode [Time = N (s)] The value N should be a multiple of 5 between 5 and 25.
	039D - 03A0: CNG detection parameters
039D	Maximum acceptable CNG OFF-time [Time = N x 20 (ms)]
039E	Minimum acceptable CNG OFF-time [Time = N x 20 (ms)]
039F	Maximum acceptable CNG ON-time [Time = N x 20 (ms)]
03A0	Minimum acceptable CNG ON-time [Time = N x 20 (ms)]
03A1	Country code transfered from the LIU (Hex) 00: France 01: Germany 02: UK 03: Italy 04: Austria 05: Belgium 06: Denmark 07: Finland 08: Ireland 09: Norway 0A: Sweden 0B: Switzerland 0C: Portugal 0D: Netherlands 0E: Spain
03C3	Mode selection in Auto Select mode Bit 3 2 1 0 Mode 0 0 0 1 Auto Tel/Fax switch with AVM 0 0 1 0 Auto Tel/Fax switch with ringback tone 0 0 1 1 Semi-Auto (TAM) mode
20AD - 226E	Activity Log generation area (30 bytes x 15 communications)
2272 - 2433	Service report and error report generation area (45 bytes x 10 communications)
2438 - 24F7	Error code memory (up to 32 codes x 6 bytes)
2A80	Received page counter (BCD) — High: Tens digit — Low: Units digit
2A81	High: Thousands digit — Low: Hundreds digit
2A82	High: Hundred thousands digit — Low: Ten thousands digit
2A83 - 2A85	Transmitted page counter (Refer to the transmitted page counter)
2A86	Printed page counter (BCD) — High: Tens digit — Low: Units digit
2A87	High: Thousands digit — Low: Hundreds digit
2A88	High: Hundred thousands digit — Low: Ten thousands digit
2A89 - 2A8B	Scanned page counter (Refer to the scanned page counter)
5002 - 5100	Modem rate histories used in the last 5 communications to the terminals programmed in the Speed/Short dials and to the forwarding terminal. (5 bytes x 51 destinations) [0: No history, 1: 2400 bps, 2: 4800 bps, 3: 7200 bps, 4: 9600 bps]
5116	Number of characters in the CSI - 14 (H)

Address (Hex)	Function
5117 - 512A	CSI (ASCII)
512B	Number of characters in the TTI - 20(H)
512C - 514B	TTI (ASCII)
6340	AVM language in AUTO and TAM modes. AVM ROM A 1(D): English 2(D): German 3(D): Dutch 4(D): French AVM ROM B 1(D): English 2(D): Swedish 3(D): Danish 4(D): Norwegian 5(D): Finnish AVM ROM C 1(D): English 2(D): Italian 3(D): Spanish 4(D): Portuguese
6341	Second AVM language in AUTO and TAM modes. (Same as above)

4-2-3. Format of Activity Log (Sent Fax Report) Generation Area

The Activity Log and the Sent Fax Report are generated from 0700 - 0719 (H) (PFC15/PFC25) and 20AD - 226E (H) (PFC35/PFC45). The record of each communication is stored in the unit of 26 bytes (PFC15/PFC25) and 29 bytes (PFC35/PFC45) as explained in the following table.

Byte No. PFC15/PFC25	Byte No. PFC35/PFC45	Functions
0	0	Header Bit 7: Sent Fax Report (1: Enabled) Bit 6 though 0: Not used
-	1	Communication start time Month (BCD)
-	2	Communication start time Day (BCD)
-	3	Communication start time Hour (BCD)
-	4	Communication start time Minute (BCD)
1 - 20	5 - 24	Remote terminal's RTI, TSI or CSI (ASCII)
21	25	Communication mode Bit 7: Resolution step down (1: Yes) Bit 6: Reduction (1: Yes) Bit 5: 0: Standard 0: Super Fine 1: Fine 1: Not used 4 0 1 0 1 Bit 3: Forwarding (1: On) Bit 2: Memory tx/rx (1: Yes) Bit 1: ECM (0: Non-ECM, 1: ECM) Bit 0: Tx or Rx (0: Rx, 1: Tx)
22	26	Communication time Minutes (BCD)
23	27	Communication time Seconds (BCD)
24	28	Communication result and causes of error Bit 7: Result (0: OK, 1: Error) Bit 6: Document jam (1: Yes) Bit 5: Authorized reception (0: Not rejected, 1: Rejected) Bit 4: Not used Bit 3 - 0: Cause of error (BCD) 7 (BCD): Not used 6 (BCD): 5 (BCD): 8 minutes close 4 (BCD): Busy 3 (BCD): T1 time over in telephone call 2 (BCD): T1 time over in fax call 1 (BCD): Errors during fax communication 0 (BCD): No error
25	29	Total page(s) (BCD)

4-2-4. Format of Service Report and Error Report Generation Area

The Service Report and the Error Report are generated from 071A - 07E6 (H) (PFC15/PFC25) and 2272 - 2433 (H) (PFC35/PFC45). The record of each error communication is stored in the unit of 41 bytes (PFC15/PFC25) and 45 bytes (PFC35/PFC45) as explained in the following table. The PFC15/PFC25 can store up to 5 error communication records, and the PFC35/PFC45 can store up to 10 records.

Byte No. PFC15/PFC25	Byte No. PFC35/PFC45	Functions	
0 - 25	0 - 29	Same as the Activity Log memory	
26	30	Error page #1	(BCD)
27	31	Error page #2	(BCD)
28	32	Error page #3	(BCD)
29	33	Error page #4	(BCD)
30	34	Error page #5	(BCD)
31	35	Error code #1 (High)	(BCD)
32	36	Error code #1 (Low)	(BCD)
33	37	Error code #2 (High)	(BCD)
34	38	Error code #2 (Low)	(BCD)
35	39	Error code #3 (High)	(BCD)
36	40	Error code #3 (Low)	(BCD)
37	41	Error code #4 (High)	(BCD)
38	42	Error code #4 (Low)	(BCD)
39	43	Error code #5 (High)	(BCD)
40	44	Error code #5 (Low)	(BCD)

4-2-5. Format of Error Codes Memory

The error codes are stored in 0F80 - 0F93 (H) (PFC15/PFC25) and 2438 - 24F7 (H) (PFC35/PFC45). Each error code is stored in the unit of 2 bytes (PFC15/PFC25) and 6 bytes (PFC35/PFC45) as explained in the following table. The PFC15/PFC25 can store up to 10 error codes, and the PFC35/PFC45 can store up to 32 error codes.

Byte No. PFC15/PFC25	Byte No. PFC35/PFC45	Functions	
0	0	Error code (High)	(BCD)
1	1	Error code (Low)	(BCD)
-	2	Month	(BCD)
-	3	Day	(BCD)
-	4	Hour	(BCD)
-	5	Minute	(BCD)

4-3. COUNTRY CODES

A 4 bit country code is programmed with a combination of diodes on the LIU, and it is transfered to the FCE through serial port. For the PFC15 and PFC25, an additional 4 bit country code is programmed on the LIU with a combination of 0-ohm resistors, as it does not have a serial port to transfer the country code to the FCE.

Country Code / Address Table

This table shows the address of each country code bit on the LIU.

Bit	Code -1	Code - 2 (PFC15/PFC25 only)
C0	D882	R894
C1	D883	R895
C2	D884	R896
C3	D885	R897

Country Code Settings

Country	C3	C2	C1	C0
Austria	1	1	1	1
Belgium	1	1	1	0
Denmark	1	1	0	1
Finland	1	1	0	0
France	1	0	1	1
Germany	1	0	1	0
Greece	1	0	0	1
Ireland	1	0	0	0
Italy	0	1	1	1
Netherlands	0	1	1	0
Norway	0	1	0	1
Portugal	0	1	0	0
Spain	0	0	1	1
Sweden	0	0	1	0
Switzerland	0	0	0	1
United Kingdam	0	0	0	0

A setting of 0 means that a diode (and a 0-ohm resistor for PFC15/PFC25) is installed at the corresponding address on the LIU. A setting of 1 means that a diode (and a 0-ohm resistor for PFC15/PFC25) is not installed at the corresponding address on the LIU.The country code setting is printed on the system report.

4-4. VARIABLE RESISTORS AND SWITCHES

PCB	Address	Function
FDU	R374	Tx signal output level fine adjustment
FCE	C403	Real time clock frequency adjustment. Do not adjust. (PFC35/PFC45 only)
LIU	R808	Speaker volume adjustment (user adjustable) (not for PFC15)
	R867	Ringer volume adjustment (user adjustable) (not for PFC15)
	SW880	PD/DTMF select switch (user selectable except in Austria)
	SW881	Earth break/Time break select switch (user selectable except in Austria)
PSU	SW102	A thermostat; this switches the power off automatically when the temparature goes higher than 85 ± 5 deg. C, and recovers after switching the power switch off and on or after cooling down by about 5 deg. C.

4-5. SENSORS

No.	Name	Function
SB-1	Document Sensor	Detects a document is placed in the feeder or not. The 58th bit on the SBU is used as this sensor.
SB-2	Scan Line Sensor	Detects the top of a page is at the scan line position. The 4th bit on the SBU is used as this sensor.
SB-4	Paper End Sensor	Detects paper is in the paper holder or not.
SB-5	Paper Jam Sensor	Detects paper is jammed in the printer or not.
SB-7	Cutter Start Sensor	Detects the cutter blade is at the home (start) position or not.
SB-8	Cutter End Sensor	Detects the cutter blade is at the end position or not. If the cutter blade is detected at the cutter end position, the cutter motor reverses to home the blade at the cutter start position.
SB-10	Cover Sensor	Detects the printer cover is closed or not.

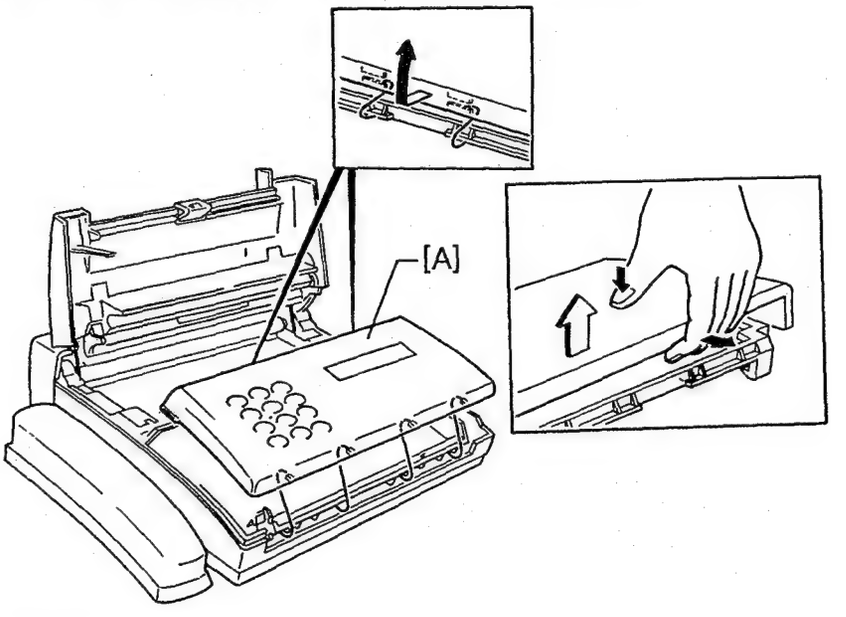
5. REMOVAL AND ADJUSTMENT

CAUTION
Unplug the machine from the power outlet before removing any of the covers.

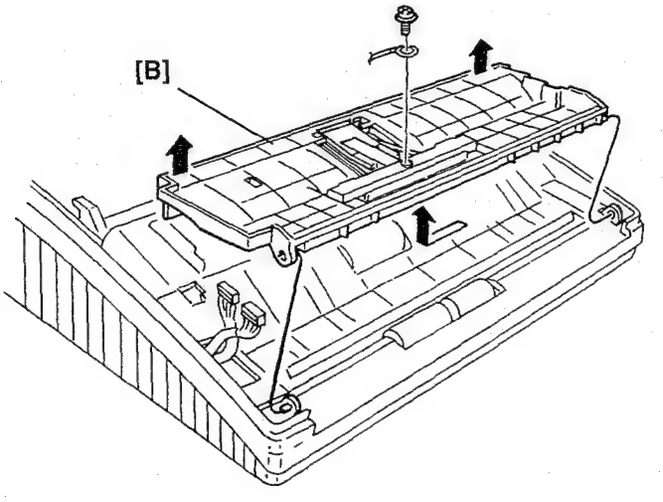
5-1. COVERS

5-1-1. Operation Panel Assembly

1. Open the ADF.
2. Remove the operation panel cover [A] by pushing the edges as shown below.



3. Disconnect both connectors.
4. Remove the lower cover [B](1 ground wire).

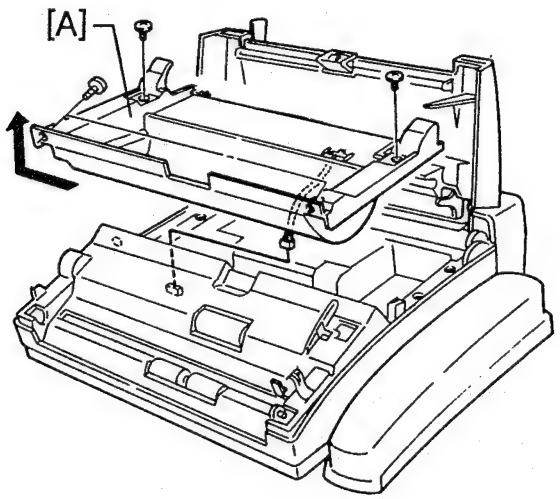


5-1-2. Paper Holder and Scanner Cover

1. Remove the operation panel assembly (see section 5-1-1).

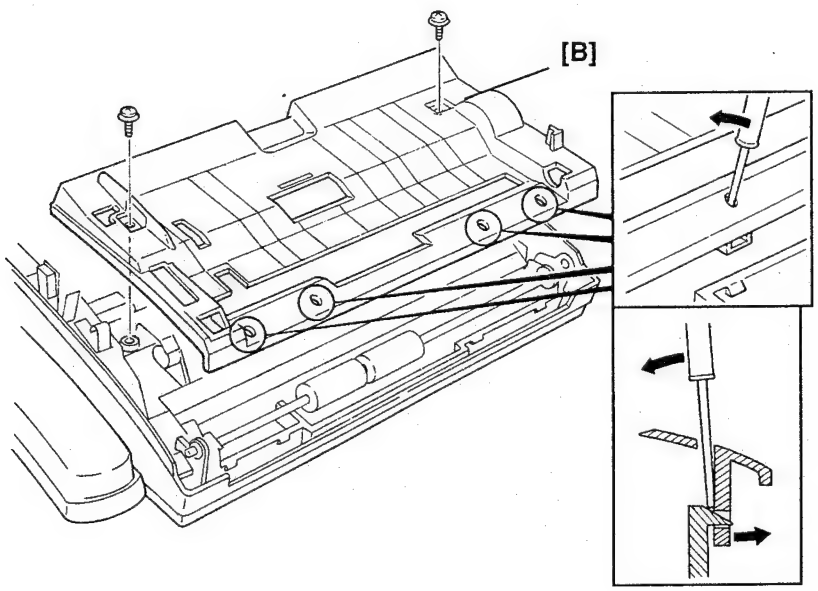
2. Open the printer cover.

3. Remove the paper holder [A] (4 screws, 1 connector).



4. Remove the scanner cover [B] by using a small watch driver as shown below.

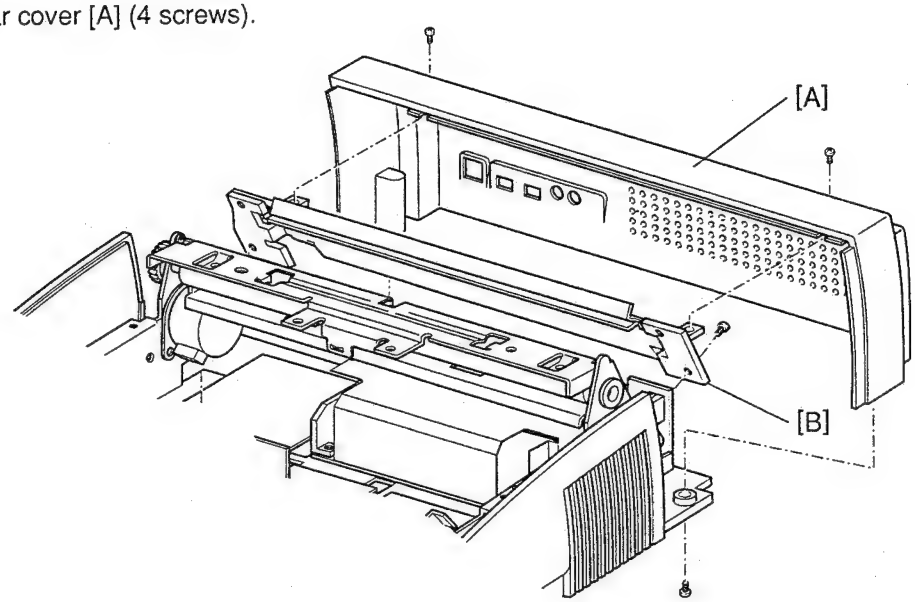
   Note: Use a driver which is less than 2mm thick, otherwise the scanner cover will warp and cause a document jam.



5-1-3. Rear Cover

1. Remove the paper tray.

2. Remove the rear cover [A] (4 screws).



5-1-4. Thermal Head and Printer Cover

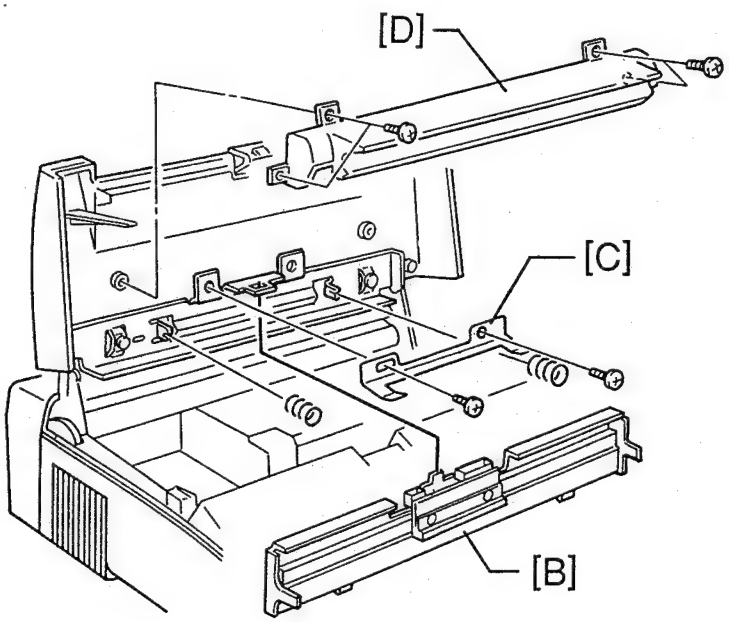
1. Open the printer cover.

2. Remove the thermal head cover [A] (4 screws).

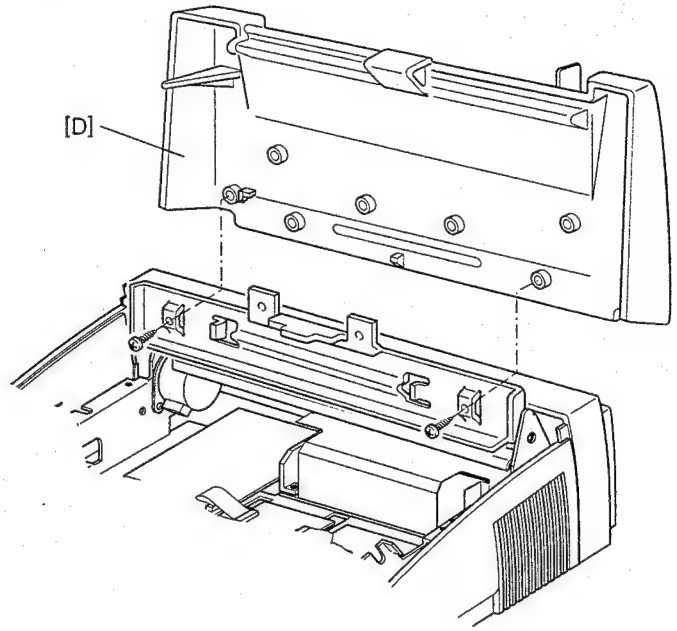
3. Remove the thermal head [B] and the spring plate [C] (2 connectors, 2 springs, 2 screws).

Reassembly Note

- The dents on the thermal head bracket must fit into the slots on the thermal head.



4. Remove the printer cover [D] (2 screws).

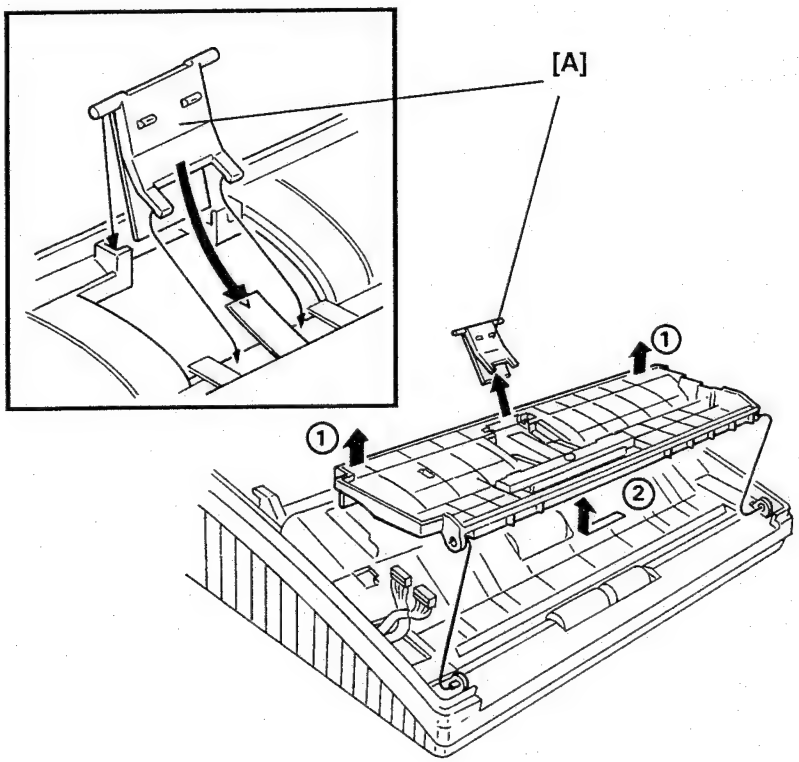


5-2. SCANNER

5-2-1. Separation Rubber Plate

1. Remove the operation panel assembly (see section 5-1-1).

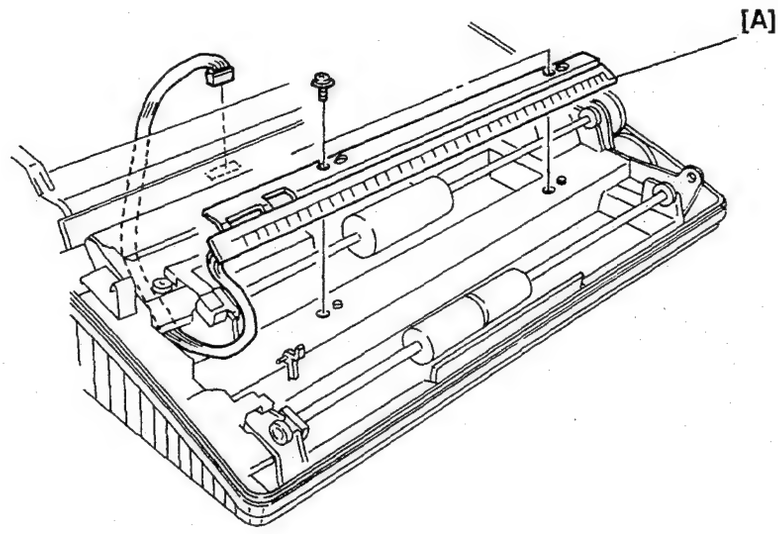
2. Remove the rubber plate [A].



5-2-2. LED Array

1. Remove the operation panel assembly, the paper holder and the scanner cover (see section 5-1).

2. Remove the LED Array [A] (2 screws, 1 connector).



5-2-3. Feed Roller

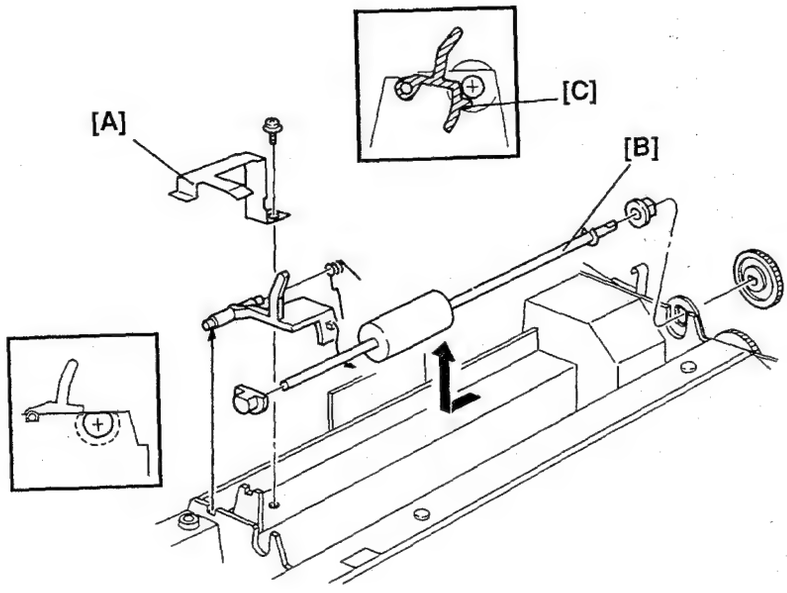
1. Remove the operation panel assembly, the paper holder and the scanner cover (see section 5-1).

2. Remove the metal bracket [A] (1 screw).

3. Remove the feed roller [B].

Note for Reassembly

- Pin [C] on the document sensor actuator must be under the feed roller shaft.

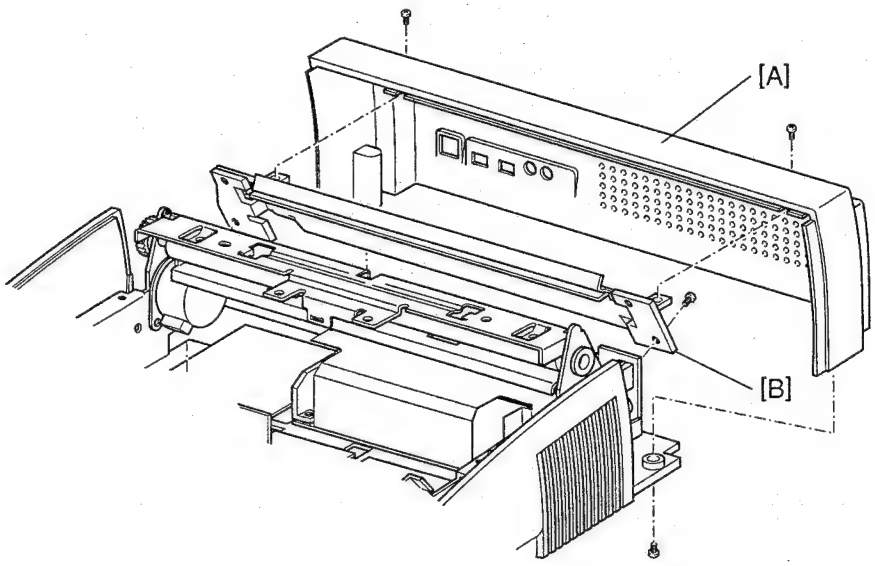


5-3. PRINTER

5-3-1. Platen Roller

1. Remove the rear cover [A] and the paper guide bracket (PFC15/PFC25/PFC35) or the cutter unit [B] (PFC45) (6 screws).

2. Remove the paper holder and the printer cover (see section 5-1)

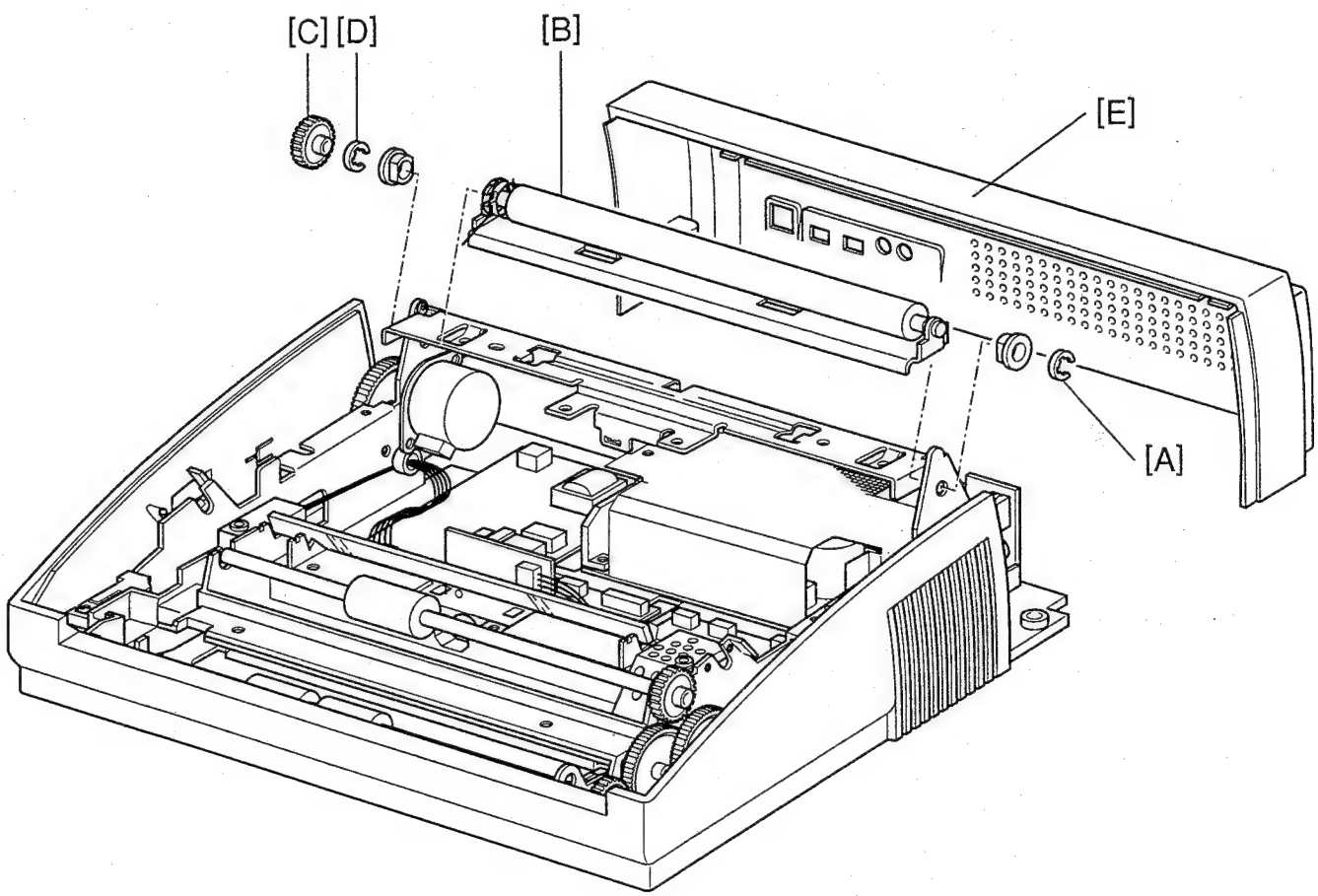


3. Remove the E-ring [A] and the bush on the right side.

4. Shift the platen roller [B] to the right and remove gear [C].

5. Remove the E-ring [D] and the bush on the left side.

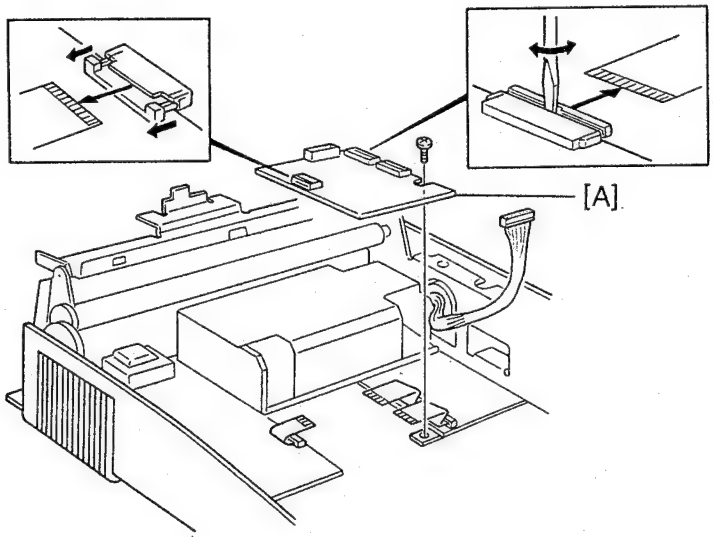
6. PFC15/PFC25/PFC35: Remove the platen roller [B].
   PFC45: Remove the decurler and platen roller [B].



5-4. PCBs

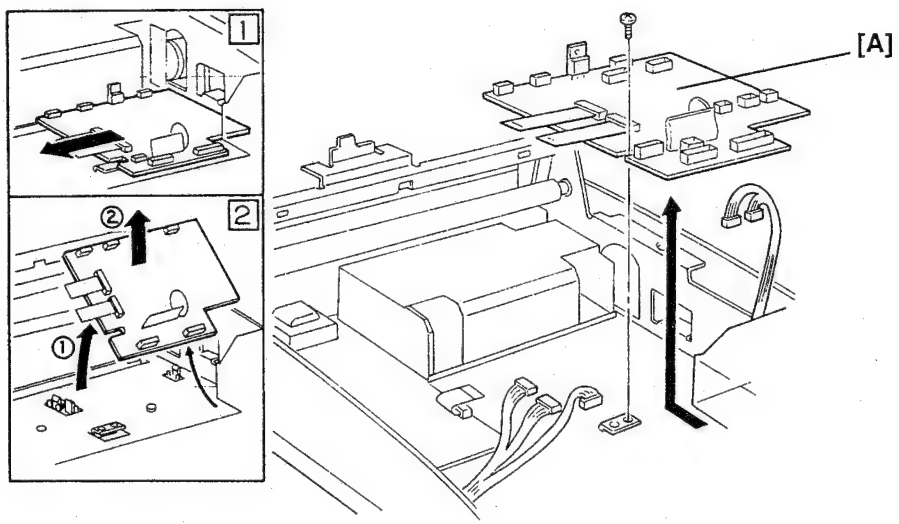
5-4-1. FCE and ROM

1. Remove the paper holder (see section 5-1).
2. Remove the FCE [A] (1 screw, 1 connector (PFC15/PFC25), 2 connectors (PFC35/PFC45), 3 flat cables).
3. Remove the ROM.
   (use a PLCC remover 4822 395 60049)



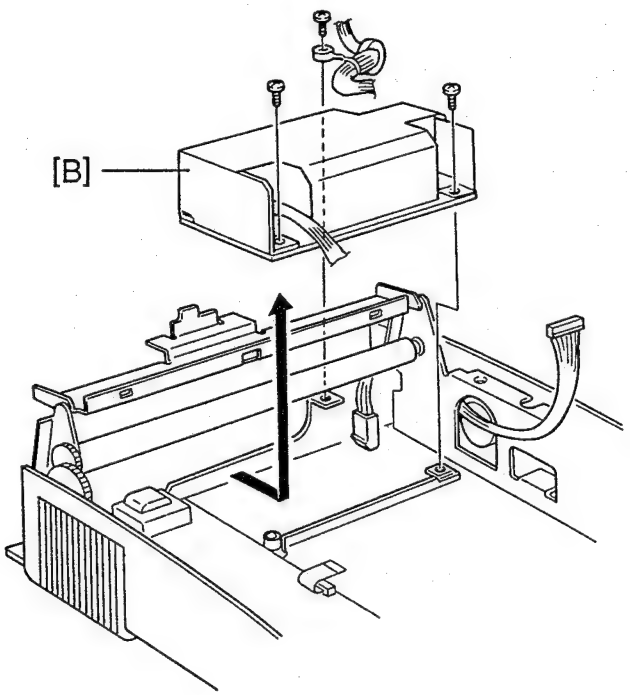
5-4-2. FDU, PSU and LIU

1. Remove the paper holder (see section 5-1).
2. Remove the FCE (see section 5-4-1).
3. Remove the FDU [A] (1 screw, 10 connectors (PFC15), 11 connectors (PFC25/PFC35), 12 connectors (PFC45), 2 flat cables). Readjust R374 on the FDU after replacing the FDU.
   (for PFC15/PFC25 see section 2-2-7), (for PFC35/PFC45 see section 3-2-11).

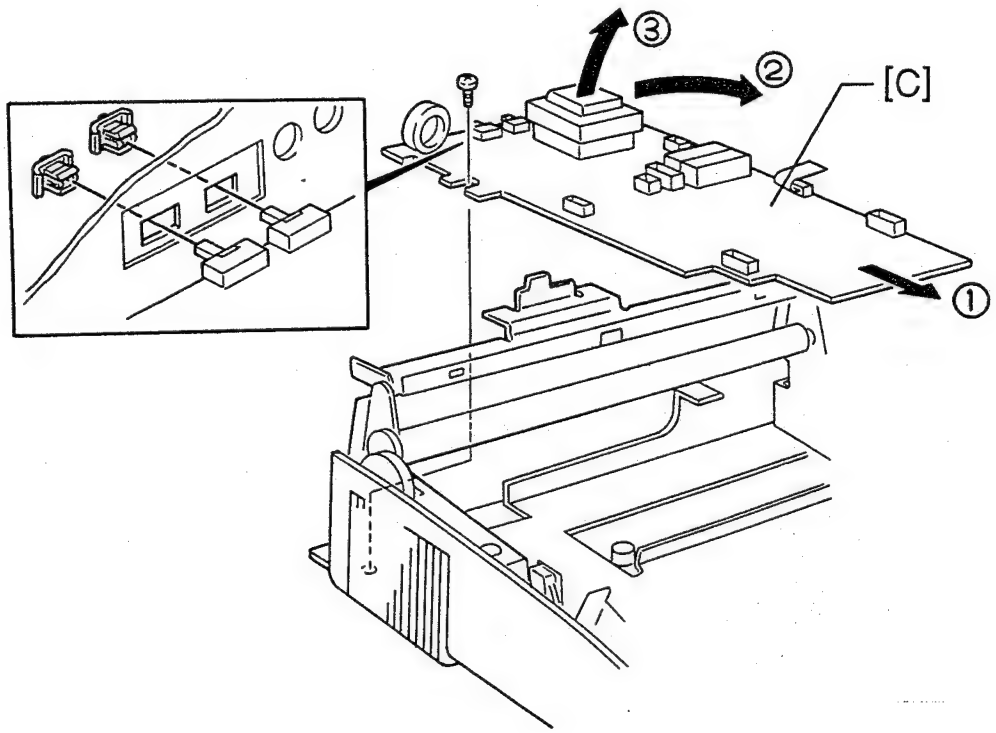


4. Remove the rear cover and the paper guide bracket (or paper cutter for PFC45) (see section 5-1 and 5-3-1)

5. Remove the PSU [B] (2 screws, 2 connectors).



6. Remove the LIU [C] (2 screws, 7 connectors (PFC25/PFC35/PFC45), 2 connectors (PFC15)).

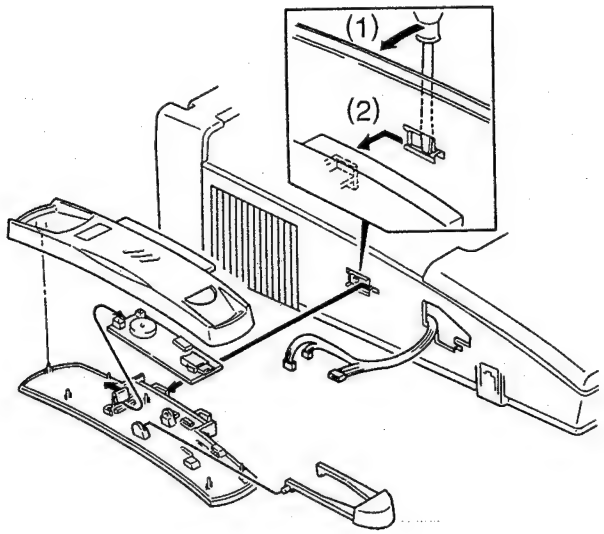


5-4-3. Cradle unit

1. Remove the paper holder (see section 5-1).

2. Remove the cradle unit as shown below.

Note: The cradle unit can not be disassembled



5-5. SBU REPLACEMENT AND SCANNER/SENSOR ADJUSTMENT

5-5-1. SBU Adjustment Tools

1. Adjustment Kit (4822 395 50433)
2. Test PCB (4822 212 60187)

Additionally, the test chart which is included in the adjustment kit is available with the part number 4822 397 30251.

5-5-2. SBU Replacement

1. Unplug the machine from the wall outlet.
2. Remove the printer cover, operation panel assembly, and scanner cover (see sections 5-1 and 5-3).
3. Remove the SBU (2 screws, 1 connector at P302 on the FDU)

5 -5-3. Scanner/Sensor Adjustment

Every time you replace the SBU or when the machine has a document non-feed or jam problem because of incorrect scanner/sensor adjustment, adjust the scanner/sensor mechanism as shown below.

As the scanner has 2 features, scanning document and detecting sensor actuator movement, the scanner needs exact adjustment. Refer to the APPENDIX-E for more details on scanner/sensor mechanism.

This section is divided into 4 parts;

1. Preparation
2. Horizontal Scan Line Adjustment
3. Vertical Scan Line Adjustment
4. Focusing

"Preparation" explains how to set up SBU adjustment tools in the machine.

"Horizontal Scan Line Adjustment" explains how to adjust the holizontal position of the SBU with the tools. This section is quite important because the machine cannot detect sensor movement unless the SBU is well adjusted.

"Vertical Scan Line Adjustment" explains how to adjust the vertical position of the SBU with the tools. The new test chart is designed so that the SBU can be adjusted vertically.

"Focusing" explains how to adjust focusing on the CCD. Adjusting the lens positoin is a bit difficult than current models.

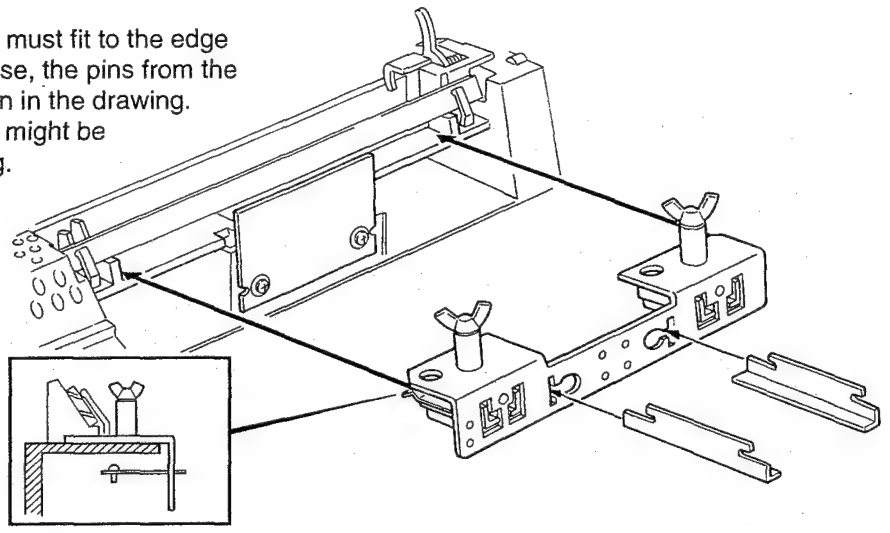
1. Preparation

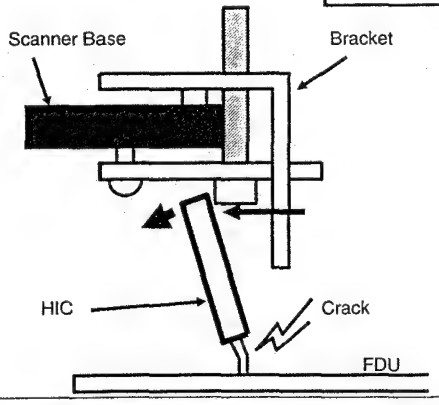
1. Install a new SBU in the machine. (Do not connect the harness to the FCU.)

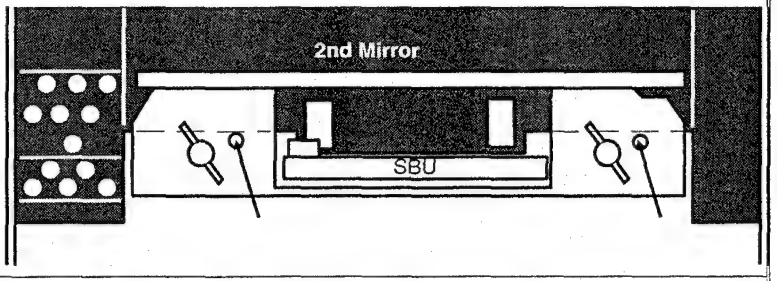
2. Clamp the bracket to the scanner base. Set the left side of the bracket first as shown below.

Notes:

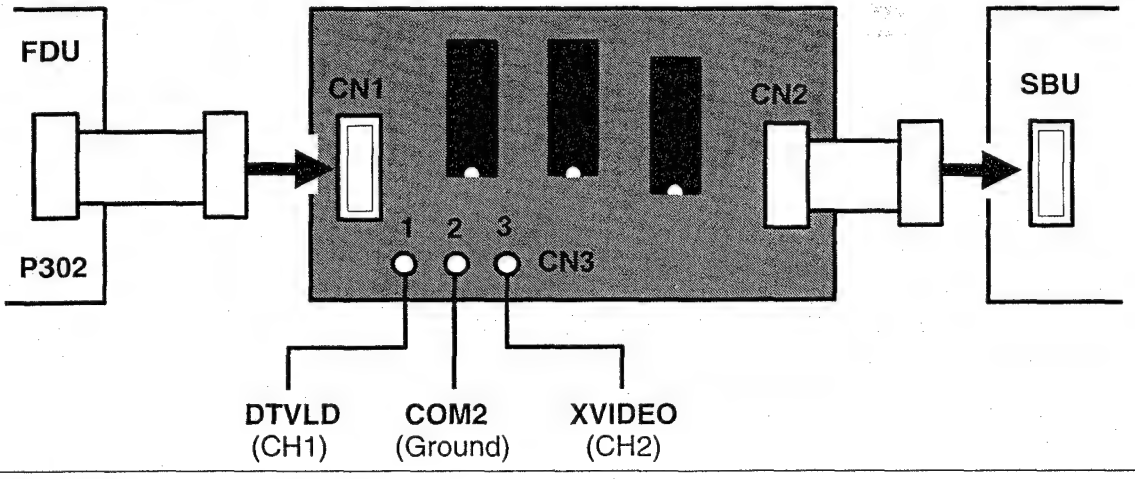
1. The dents on the bracket must fit to the edge of scanner base. Otherwise, the pins from the HIC might crack as shown in the drawing.
2. The shape of the bracket might be different from the drawing.







3. Connect the harness from the test PCB to P302 on the FDU, then connect the SBU harness on the test PCB.



4. Connect the test pins to the oscilloscope as follows:
   Pin 1 (DTVLD) - Channel 1 (CH1) on the oscilloscope
   Pin 2 (COM2) - Ground
   Pin 3 (XVIDEO) - Channel 2 (CH2) on the oscilloscope

5. Attach the test chart to the machine.

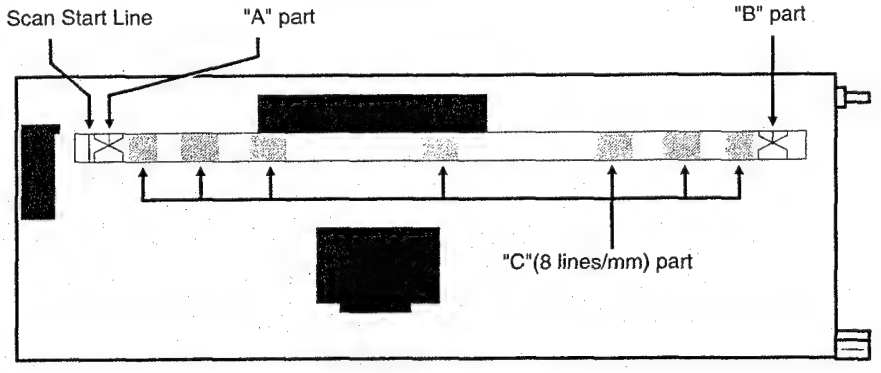
1. Preparation

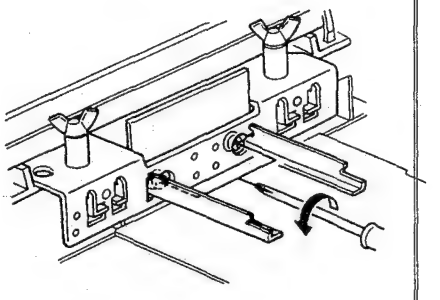
6. Connect the operation panel to the machine.

7. Enter the service mode and switch the LED array on
(see section 2-2-2 for PFC15/PFC25 and section 3-2-13 for PFC35/PFC45).

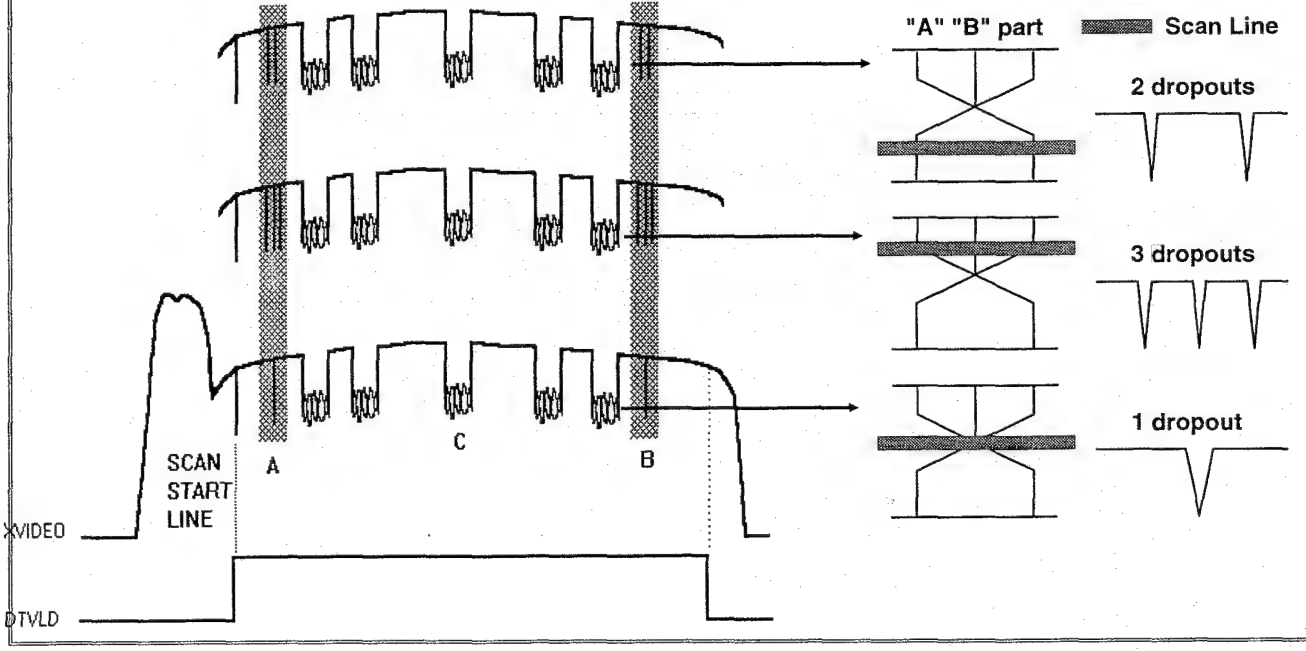
8. Set the oscilloscope as follows;
CH2 (XVIDEO) - 0.5 V/div.
TIME - 0.1 ms/div.
Then, select CH2 (XVIDEO) on the oscilloscope..

9. The XVIDEO signal shows one of the waveforms shown below. One, two or three dropouts should appear at "A" and "B" depending on the vertical scan line position, and moire should appear at "C".
If this waveform cannot be seen on the oscilloscope screen, loosen the SBU securing screws and adjust the SBU position until this waveform appears on the screen.
The moire sometimes does not appear on the screen unless the lens is well focused. So, if the moire does not appear on the screen, go to the **"Focusing"** procedure first, then go to the **"Horizontal/Vertical Scan Line Adjustment"** procedure. If this wavefrom appears on the screen, go to the **"Horizontal/Vertical Scan Line Adjustment"** procedure, then check that the moire at "C" satisfies the criterion in the **"Focusing"** section.





Test Chart attached on the Pressure Plate

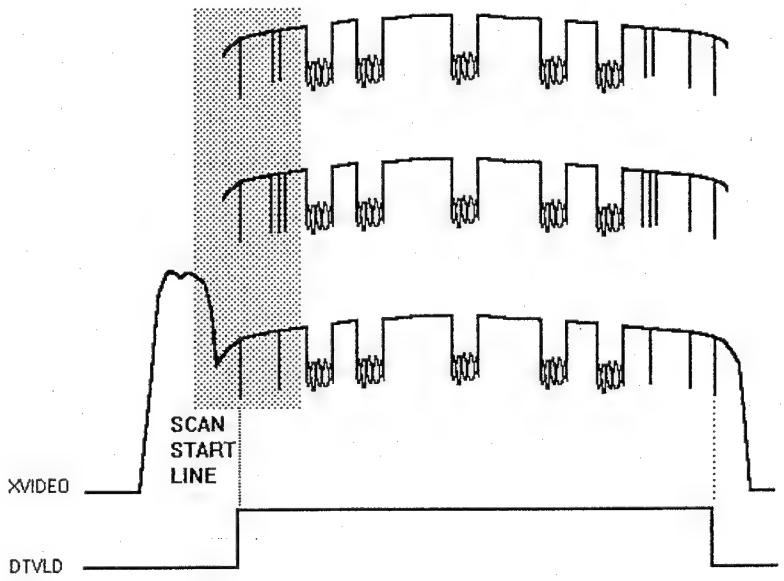


2. Horizontal Scan Line Adjustment

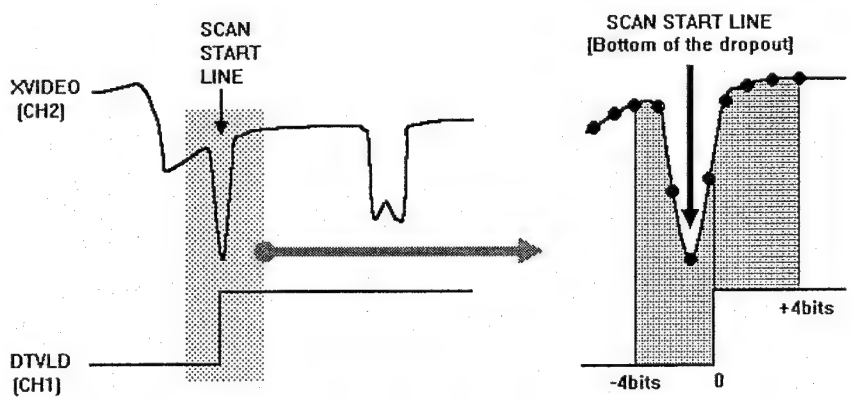
1. Set the oscilloscope as follows;
   CH1 (DTVLD) - 1 V/div.
   CH2 (XVIDEO) - 0.5 V/div.
   TIME - 0.1 ms/div.
   Use ALT mode to display CH1 and CH2 at the same time.

2. Loosen the SBU securing screws.

3. The XVIDEO signal shows one of the waveforms shown below.



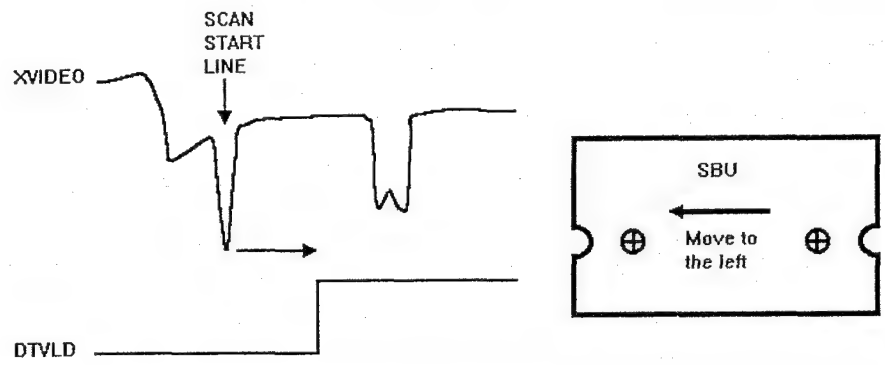
4. Enlarge the shaded part of the waveform above by changing the TIME scale to 50 µs/div or 20 µs/div. The scan start line appears as the first sharp dropout from the left of the XVIDEO signal on the oscilloscope. The dropout of the waveform has to be within ±4 bits from the rising edge of the DTVLD signal as shown below.



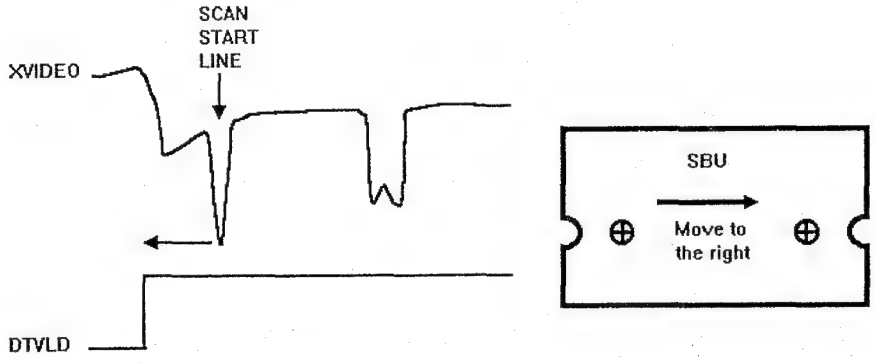
If the scan start line is not at the correct position, go to step 5 to adjust the horizontal scan line position.

2. Horizontal Scan Line Adjustment

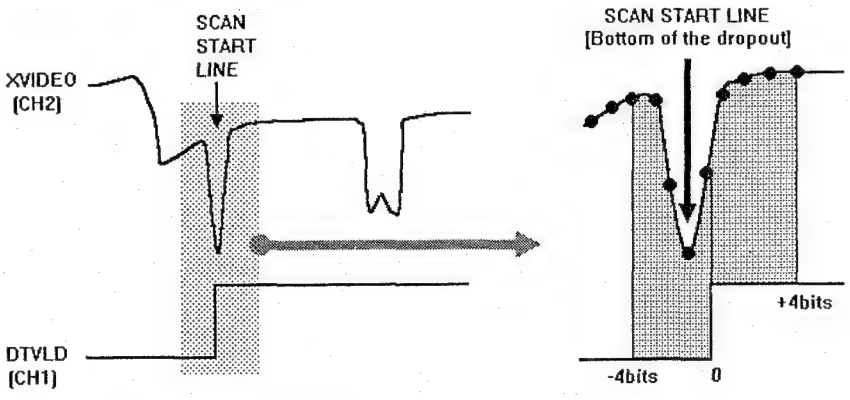
5. Adjust the horizontal scan line position as shown below.
If the scan start line is to the left of the rising edge of the DTVLD signal, move the SBU to the left.



If the scan start line is to the right of the rising edge of the DTVLD signal, move the SBU to the right.



6. After adjustment, be sure that the scan start line is within ± 4 bits from the rising edge of the DTVLD signal, then go to the **"Vertical Scan Line Adjustment"** procedure.

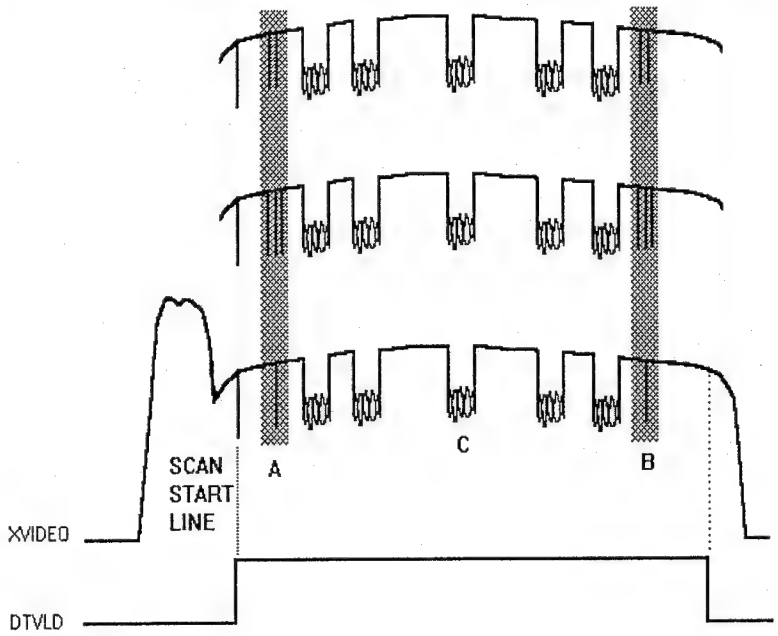


Note: Scan end line adjustment is not necessary.

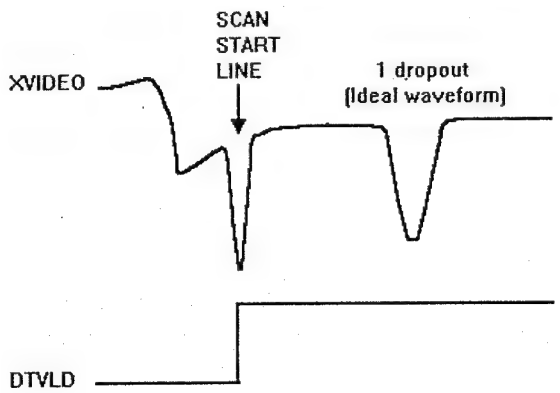
3. Vertical Scan Line Adjustment

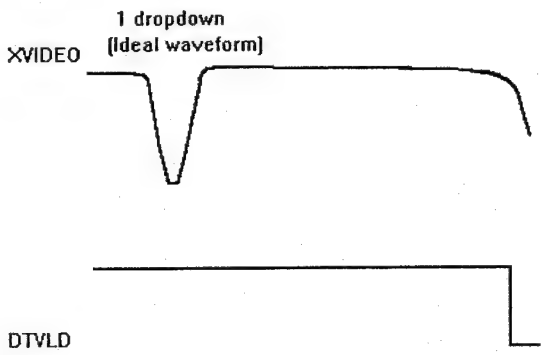
1. Set the oscilloscope as follows;
   CH1 (DTVLD) - 1 V/div.
   CH2 (XVIDEO) - 0.5 V/div., Not inverted
   TIME - 0.1 ms/div.
   Use ALT mode to display CH1 and CH2 at the same time.

2. The XVIDEO signal shows one of the waveforms shown below.
At "A" and "B" on the XVIDEO wavefrom, one, two or three dropouts are seen now.



Enlarge areas "A" and "B" by changing the time scale to 50 µs/div or 20 µs/div.
The ideal waveform should have only one dropout at each of "A" and "B". If the waveform has two or three dropouts there, go to step 3 to adjust the "A" part (scan start side) and/or step 4 to adjust the "B" part (scan end side).

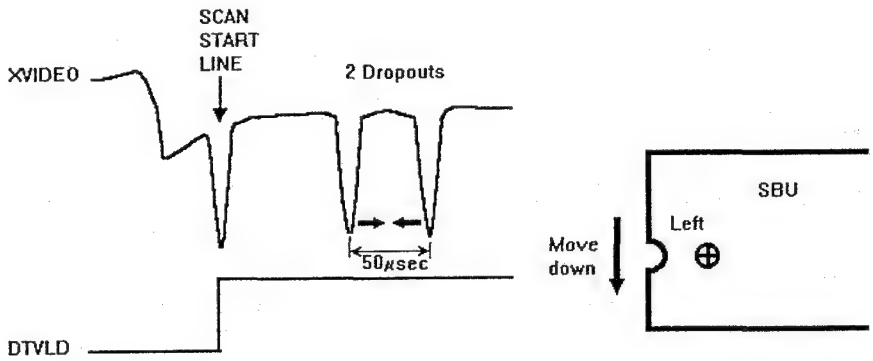




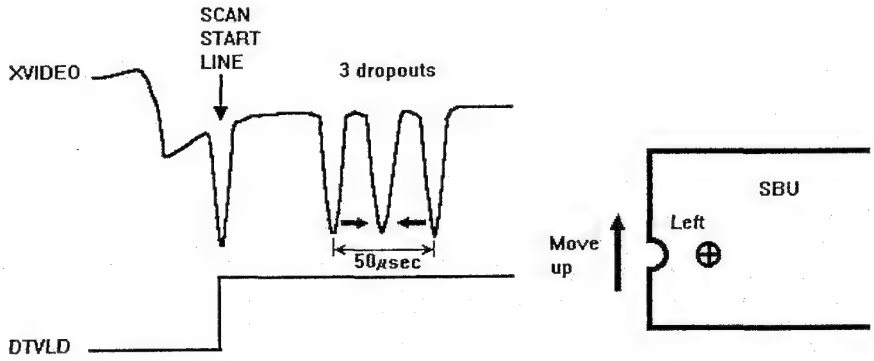
3. Vertical Scan Line Adjustment

3. Adjustment at the scan start side.

If the waveform has two dropouts at the scan start side, move down the left side of the SBU to make the distance between peaks narrower. The distance between peaks has to be within 50 µs.

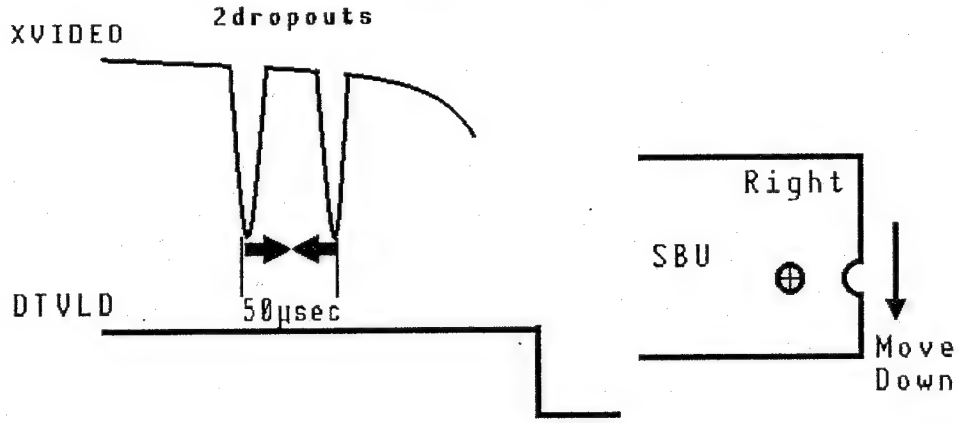


If the waveform has three dropouts at the scan start side, move up the left side of the SBU to make the distance between peaks narrower. The distance between peaks has to be within 50 µs.

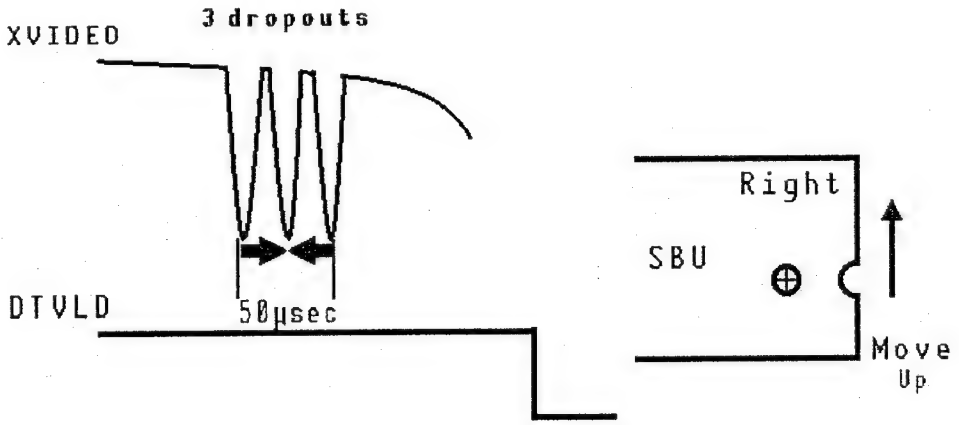


3. Vertical Scan Line Adjustment

4. Adjustment at the scan end side.
If the waveform has two dropouts at the scan end side, move down the right side of the SBU to make the distance between peaks narrower. The distance between peaks has to be within 50 µs.



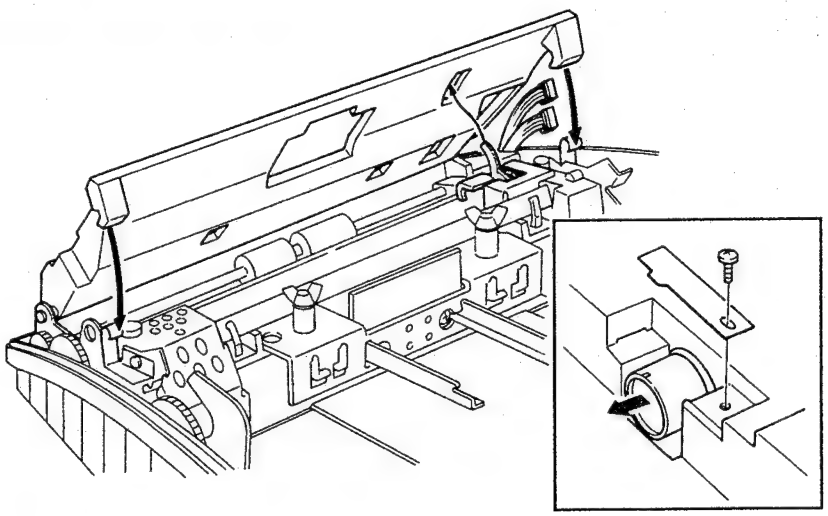
If the waveform has three dropouts at the scan end side, move up the right side of the SBU to make the distance between peaks narrower. The distance between peaks has to be within 50 µs.



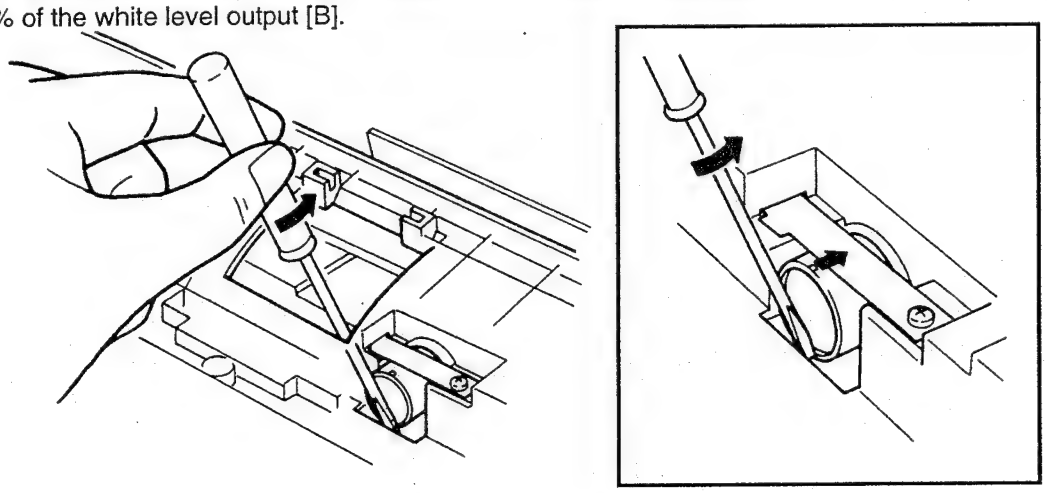
5. After adjusting the scan end side, confirm that the scan start side is still well adjusted, as the adjustment at one side often changes the waveform at the other side.

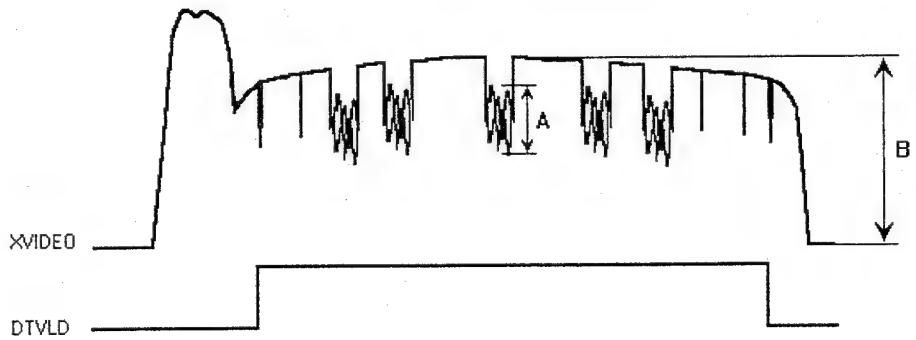
4. Focusing

1. Loosen the lens securing screw [A] and pull out the lens 1 or 2 mm from the scanner base surface as shown on the right.



2. Move back the lens using a small (-) screwdriver so that the amplitude of moire [A] becomes more than 20% of the white level output [B].





3. Tighten the lens securing screw.

After finishing the adjustments, switch off the power, take out the adjustment tools, bracket, test lead and the white pressure plate from the machine. Then reassemble the machine.

6. TROUBLESHOOTING

6-1. COPY QUALITY PROBLEMS

6-1-1. Received Copies

If there is no fault in the receiving terminal or on the line, but the copy quality is bad, do the following:

- Check that the thermal head, platen roller and spring plate assembly are assembled completely.
- Clean the thermal head (soft cloth and alcohol).
- Replace the thermal head or FDU.

6-1-2. Printouts Made in Copy Mode

If printouts of received fax messages are OK but printouts made using copy mode are not, the following faults must be considered in addition to the printer faults mentioned above.

Symptom	Remedies
Blank or black copies	• Check the scanner/sensor mechanism and adjust or replace any defective parts.
	• Replace the SBU or FDU.
Vertical black lines on the copy	• Clean the scanner optics and LED array (soft cloth).
	• Replace the SBU if there are any sharp peaks or dropouts in the CCD waveform.
Uneven density	• Adjust the scan line position (see section 5-5-3)
	• Clean the scanner optics and LED array (soft cloth).
	• Replace the LED array if it is defective.
Magnification	• Check that the mirrors are assembled correctly on the scanner base.
Blurred characters	• Adjust the focusing (see section 5-5-3).
Filled-in characters	• Adjust the focusing (see section 5-5-3).
Side-to-side registration error	• Adjust the scan start position (see scetion 5-5-3).
One side darker than the other	• Adjust the CCD waveform flatness (see section 5-5-3).
	• Check the LED array; replace it if it is defective.
Image only partially scanned	• Adjust the scan line position and/or scan start position (see section 5-5-3).

6-1-3. Effects of Line Problems on Copy Quality

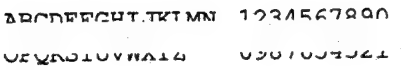
Missing lines; shrinkage in the sub scan direction

- Original -

ABCDEFGHIJKLMN 1234567890

OPQRSTUVWXYZ 0987654321

- Bad Copy Sample -



Cut off

- Bad Copy Sample -

ABCDEFGHIJKLMN 1234567890

Some lines may be missing
just before the cut off.

6-2. MACHINE OPERATION

Use the following procedures while referring to the point-to-point diagram and signal tables. The procedures may not be exhaustive, but they may help you to solve the problem.

6-2-1. Scanner/Document Feeder

1. Non-feed

Test	Action if Yes	Action if No
1. Is the scanner cover closed properly?		
2. Was the document placed in the feeder correctly? Was the document of a recommended type?		
3. Is the document fed into scanner after you place it in the ADF ?	Finished.	Go to test 4.
4. Does the document sensor actuator move correctly.	Go to test 5.	Reassemble or replace the actuator. Go back to test 3.
5. Do the two red LEDs on the lefthand side of the LED array light correctly, without a document in the feeder ?	Go to step 6.	Check the +5V output from the FDU. If the output is correct, replace the LED array. Then go back to test 3.
6. Does the LED array all light up, with a document in the feeder ?	Go to step 7.	Adjust the scan start position.

Test	Action if Yes	Action if No
7. Plug the machine in and switch the power on. Does the PSU output +24V?	Check the PSU-FDU connection. Go to test 8.	If the wall socket is good, replace the PSU.
8. Check the connection to the tx motor. Does the FDU both: a) output +24V to the tx motor, b) output stepper motor drive phase signals to the motor?	Replace the FCE.	Replace the FDU.

2. Double Feed

Test	Action if Yes	Action if No
1. Was the document placed in the feeder carefully and in the correct manner?		
2. Clean or replace the separation rubber plate.		
3. Does the operation panel closed at each side ?		

3. Jam

Test	Action if Yes	Action if No
1. Check that the document is not curled seriously or not longer than 600 mm.		
2. Clean the rollers in the feeder/scanner with a soft cloth and water.		
3. Check for blockages in the document feed path. Check the scanner drive mechanism.		
4. Check that the scan line sensor actuator moves correctly.	Go to test 5.	Reassemble or replace the actuator.
5. Chenck that the two red LEDs on the lefthand side of the LED array light correctly, without a document in the feeder.	Go to step 6.	Check the +5V output from the FDU. If the output is correct, replace the LED array.
6. With a document at the scan start position, check the SBU output shows the correct dropout at the scan line sensor (SB-2) part of the waveform.	Replace the FCE.	Adjust the scan start position or replace the SBU.

4. Skew

Test	Action if Yes	Action if No
1. Clean the rollers in the feeder/scanner with a soft cloth and water.		
2. Clean or replace the separation rubber plate.		
3. Does the operation panel closed at each side ?		

5. Dirty Document

Test	Action if Yes	Action if No
1. Clean the rollers in the feeder/scanner with a soft cloth and water.		

6-2-2. Printer

1. Non Feed

Symptom: Non feed		
Check	**Action if Yes**	**Action if No**
1. Is the printer jammed with debris?	Clear the debris.	Go to step 2.
2. Is the printer cover closed properly?	Go to step 3.	Close the cover.
3. Are the connections between the FCE, FDU, and cover sensor loose?	Connect the cables properly.	Go to step 4.
4. Does the FDU switch on +24VSW when a ringing signal is detected or when Copy is pressed?	Go to step 8.	Go to step 5.
5. Does the signal from the cover switch change when the cover is opened and closed?	If CLOSE PAPER COVER is not displayed when the cover is open, change the FCE. Go to step 6.	Change the cover switch and/or the actuator mechanism.
6. Are the connections between the FDU, LIU, and telephone line loose?	Connect the cables properly.	Go to step 7.
7. Does the FCE send the +24VON signal to the FDU when a ringing signal is detected or when Copy is pressed?	Replace the PSU.	Replace the FDU or LIU.
8. Are the connections between the FDU and the paper end sensor loose?	Connect the cables properly.	Go to step 9.
9. Does the Replace Paper indicator light when paper is present?	Go to step 11.	Go to step 10.
10. Does the signal from the paper end sensor change in the correct way?	Change the FCE.	Replace the paper end sensor.
11. Are the connections between the PSU, FDU, and the rx motor loose?	Connect the cables properly.	Go to step 12.
12. Does the FDU output power and phase drive signals to the rx motor?	Replace the rx motor.	Replace the FDU.

2. Jam

Symptom: Jam		
Check	**Action if Yes**	**Action if No**
1. Is the printer jammed with debris?	Clear the debris.	Go to step 2.
2. Is the printer jam sensor good?	Go to step 5.	Go to step 3.
3. Are the connections between the printer jam sensor and the FDU loose?	Connect the cables properly.	Go to step 4.
4. Does the signal from the printer jam sensor change correctly?	Change the FDU.	Replace the printer jam sensor.
5. Is the cutter blade at the home position (lefthand side of the machine) ?	Go to step 6.	Open the printer cover, set paper, and close the printer cover. Go to step 8.
6. Are the connections between cutter and FDU loose ?	Connect the cables properly.	Go to step 7.
7. Does the signal from cutter start/end position sensors change correctly ?	Replace the FDU	Replace the cutter unit.
8. Does the cutter initialize itself ?	Go to step 9.	Replace the cutter unit.
9. Are the connections between the FDU and the paper end sensor loose?	Connect the cables properly.	Go to step 10.
10. Does the Replace Paper indicator light when paper is present?	Go to step 12.	Go to step 11.
11. Does the signal from the paper end sensor change in the correct way?	Change the FDU.	Replace the paper end sensor.
12. Are the connections between the PSU, FDU, and the rx motor loose?	Connect the cables properly.	Go to step 13.
13. Does the FDU output power and phase drive signals to the rx motor?	Replace the rx motor.	Replace the FDU.

Symptom: Abnormal noise		
Check	**Action if Yes**	**Action if No**
1. Is the cover closed?	Go to step 2.	Close the cover.
2. Are the printer mechanisms assembled correctly?	Replace the rx motor or the FDU.	Assemble the machine properly.

6-3. ERROR CODES

If an error code occurs, retry the communication. If the same problem occurs, try to fix the problem as suggested below. Note that error codes 4-00, 01, 02, and 10 only appear in the error code display and on the service report.

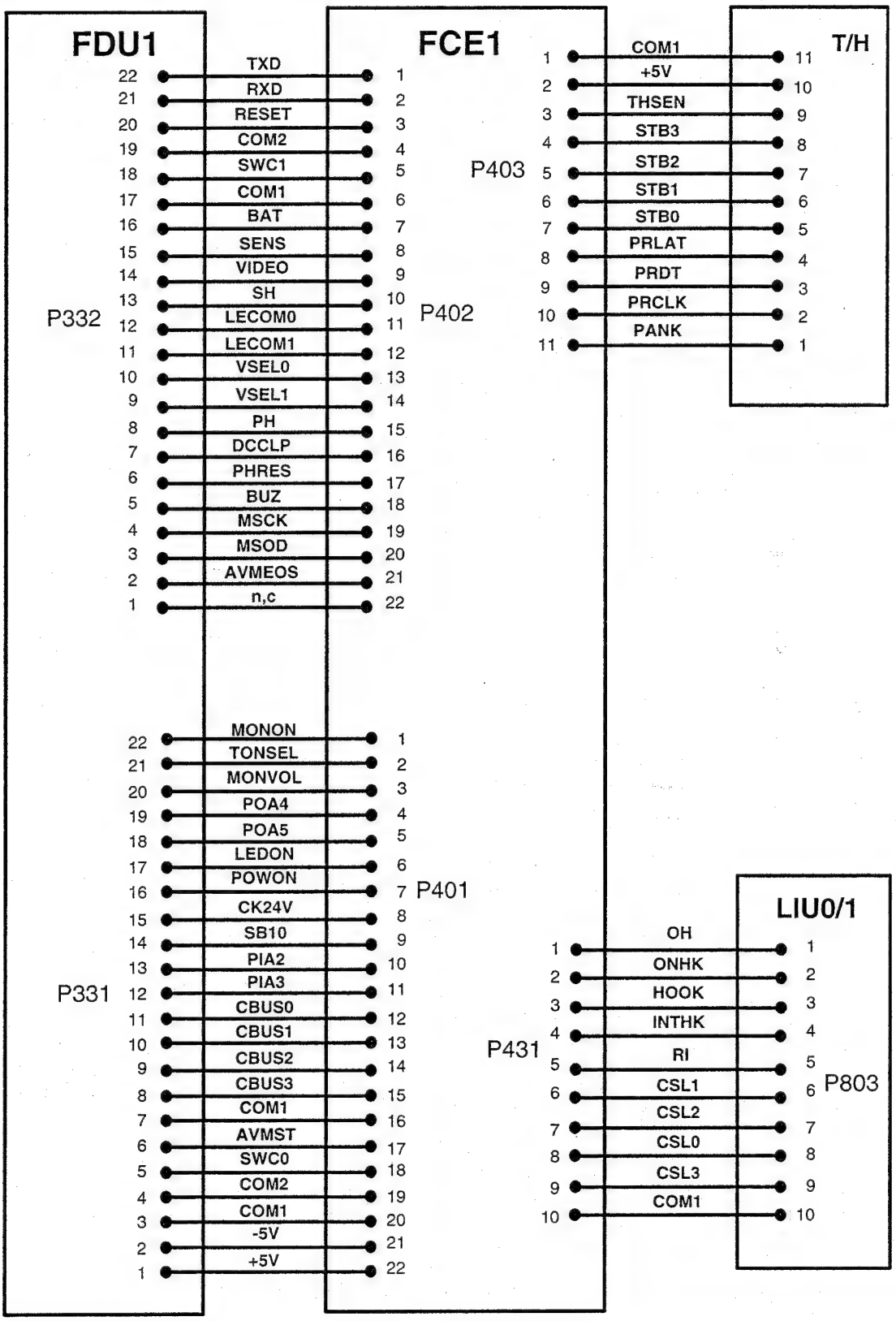
Code	Meaning	Suggested Cause/Action
0-00	DIS/NSF not detected within 40 s of Start being pressed	Check the line connection. Check the LIU - FDU - FCE connectors. The machine at other end may be incompatible. Replace the FDU or LIU. Check for DIS/NSF with an oscilloscope. If the rx signal is weak, there may be a bad line.
0-01	DCN received unexpectedly	The other party is out of paper or has a jammed printer. The other party pressed Stop during communication.
0-03	Incompatible modem at other end	The other terminal is incompatible.
0-04	CFR or FTT not received after modem training	Check the line connection. Check the LIU - FDU -FCE connectors. Try changing the tx level (use NCU parameter 10). Replace the FCE, FDU or LIU. The other terminal may be faulty; try sending to another machine. If the rx signal is weak or defective, there may be a bad line.
0-05	Unsuccessful after modem training at 2400 bps	Check the line connection. Check the FCE - LIU - FDU connectors. Try adjusting the tx level (use NCU parameter 10). Replace the FCE, FDU or LIU. Check for line problems.
0-06	The other terminal did not reply to DCS	Check the line connection. Check the FCE - FDU - LIU connectors. Try adjusting the tx level (use NCU parameter 10). Replace the FCE, LIU or FDU. The other end may be defective or incompatible; try sending to another machine. Check for line problems.
0-07	No post-message response from the other end after a page was sent	Check the line connection. Check the FCE - FDU - LIU connectors. Replace the FCE, LIU or FDU. The other end may have jammed or run out of paper. The other end user may have disconnected the call. Check for a bad line. The other end may be defective; try sending to another machine.
0-08	The other end sent RTN or PIN after receiving a page, because there were too many errors	Check the line connection. Check the FCE - FDU - LIU connectors. Replace the FCE, LIU or FDU. The other end may have jammed, or run out of paper or memory space. Try adjusting the tx level (use NCU parameter 10). The other end may have a defective modem/NCU/FCU; try sending to another machine. Check for line problems and noise.

Code	Meaning	Suggested Cause/Action
0-14	Non-standard post message response code received	Check the FCE - FDU - LIU connectors. Incompatible or defective remote terminal; try sending to another machine. Noisy line: resend. Try adjusting the tx level (use NCU parameter 10). Replace the FCE, LIU or FDU.
0-20	Facsimile data not received within 6 s of retraining	Check the line connection. Check the FCE - FDU - LIU connectors. Replace the FCE, LIU or FDU. Check for line problems. Try calling another fax machine. Change the reconstruction time from 6 s to 10 s (bit switch 01, bit 0). Switch the rx cable equalizer on (bit switch 00, bit 1).
0-21	EOL signal (end-of-line) from the other end not received within 5 s of the previous EOL signal	Check the connections between the FCE, FDU, LIU, & line. Check for line noise or other line problems Replace the FCE, LIU or FDU. The remote machine may be defective or may have disconnected.
0-22	The signal from the other end was interrupted for more than 0.2 s	Check the line connection. Check the FCE - FDU - LIU connectors. Replace the FCE, LIU or FDU. Defective remote terminal. Check for line noise or other line problems.
0-23	Too many errors during reception	Check the line connection. Check the FCE - FDU - LIU connectors. Replace the FCE, LIU or FDU. Defective remote terminal. Check for line noise or other line problems. Switch the rx cable equalizer on (bit switch 00, bit 1). Ask the other end to adjust their tx level.
1-00	Document jam	Improperly inserted document or unsuitable document type. See "Mechanical Operation - Document Jam".
1-01	Document length exceeded the maximum	Divide the document into smaller pieces. See "Mechanical Operation - Document Jam".
1-10	Document in the scanning position at power-up	Clear debris from the sensor actuators. Check the SBU horizontal adjustment. Replace SBU, FCE or FDU.
1-17	Document jam in the feed-out area	
1-20	Printer jam - paper did not reach the exit	Clear any debris from the sensors and the paper path. Clean the sensors in the printer. Check that the copy tray is not overloaded. Check the paper feed mechanism and paper path for faults. Check the connections from the FDU to the rx motor and printer sensors. Replace the rx motor, printer jam sensor, or FDU.
1-21	Printer jam - paper stuck at the exit	
1-23	Cutter jam	Clear any debris from the sensors and the paper path. Clean the cutter sensor. Check the cutter mechanism. Check the connections from the FDU to the cutter motor and cutter sensors. Replace the cutter motor, cutter sensor, or FDU.
1-24	Cutter failed to initialize	

Code	Meaning	Suggested Cause/Action
1-30	Paper ran out during printing	Add paper. If paper is present, clean the paper end sensor and check the sensor circuit for defects. Replace the FCE, FDU or the paper end sensor.
1-33	Paper end was detected when the machine was switched on	
1-34	Paper end was detected at the end of printing	
1-71	The printer cover was opened during printing	Check whether the user opened the cover during printing. Check the cover lock mechanism. Check the cover switch position and actuation. Check connections between the cover switch and the FDU. Replace the cover switch, FCE or FDU.
2-00	An RST7.5 interrupt occurred while the modem was in use	Replace the FCE.
2-10	The modem cannot enter tx mode	
2-12	Modem clock irregularity	
2-20	Abnormal coding/decoding (cpu not ready)	Replace the FCE.
2-31	Line connection failure (dc loop cannot be closed)	Check the connections from the FCE to the LIU/line. Try the communication again. Replace the FCE or LIU.
2-32	Line connection failure (dc loop cannot be opened)	Check the connections from the FCE to the LIU and line. Replace the LIU or FCE.
2-40	Thermal head driver irregularity	Check the connections between the FDU, thermal head, and PSU. Replace the FDU, thermal head, or PSU.
4-00	One page took longer than 8 minutes to transmit	Check for a bad line. Try the communication at a lower resolution, or without halftone. Change the FCE.
4-01	Line current was cut	Check the line connector. Check the connection between the FDU and the LIU. Check for line problems. Replace the FDU, the FCE or the LIU.
4-02	The other end cut the received page as it was longer than the maximum limit.	Ask the other end to change their maximum receive length setting, then resend.
4-10	Communication failed because of ID Code mismatch (Closed Network) or TSI mismatch (Authorized Reception)	Get the ID Codes the same and/or the CSIs programmed correctly, then resend. The machine at the other end may be defective.
6-99	V.21 signal not received at the expected time	Try again. The other end may be defective or the line may be bad. Otherwise, replace the LIU or FCE.
9-60	The machine sent PIN/DCN because of a mechanical error during reception, even though there was memory space available.	Repair the mechanical problem, then ask the other end to resend the message. Change the FCE.
9-61	The machine sent PIN/DCN because the memory filled up, even though the mechanism was not defective	Check the paper feed path and printer for errors (if substitute reception has occurred). Make room in the memory, then ask the other end to resend the message. Change the FCE.

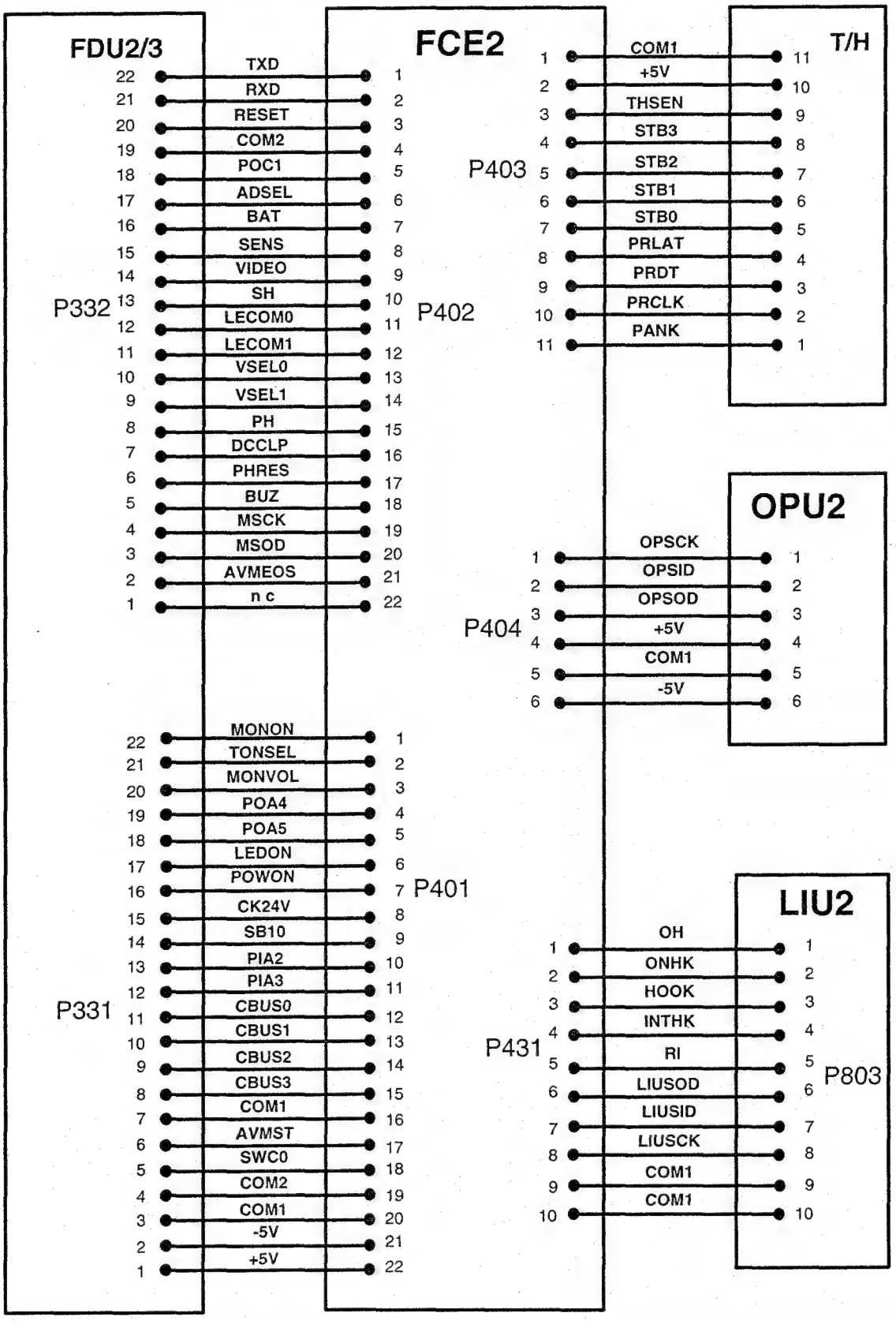
7. ELECTRICAL DATA

7-1. CONNECTION FROM FCE1 (PFC15/PFC25)



7-1

CONNECTION FROM FCE2 (PFC35/PFC45)



7-1-1. FCE1 - FDU (PFC15/PFC25)

FCE: P402			
No	Name	Function	V
1	TXD	Transmit data	0
2	RXD	Receive data	0
3	RESET	Reset out	5
4	COM2	Ground	0
5	SWC1	Serial data of the key status from the OPU	C
6	COM1	Ground	0
7	BAT	Battery power	5
8	SENS	SB-4 or SB-5	X
9	VIDEO	Analog video signal	X
10	SH	Shift clock to CCD	C
11	LECOM0	Serial data of LED status from the OPU	C
12	LECOM1		C
13	VSEL0	Video gain control 0	5
14	VSEL1	Video gain control 1	5
15	PH	First phase transfer clock	C
16	DCCLP	DC restore request	C
17	PHRES	Reset clock (CCD output buffer)	C
18	BUZ	Buzzer drive signal	0
19	MSCK	Serial clock	5
20	MSOD	Serial output data	5
21	AVMEOS	AVM end of speech	5
22	no, connection	No connection	0

FCE: P401			
No	Name	Function	V
1	MONON	Monitor speaker on	0
2	TONSEL	Tone signal select	0
3	MONVOL	Speaker volume control	0
4	POA4	KFCP output port POA4	0
5	POA5	KFCP output port POA5	0
6	LEDON	LED array drive	0
7	POWON	24V power on signal	0
8	CK24V	24V detection	5
9	SB10	Cover open	0
10	PIA2	KFCP input port PIA2	5
11	PIA3	KFCP input port PIA3	5
12	CBUS0	System command data bus	C
13	CBUS1		C
14	CBUS2		C
15	CBUS3		C
16	COM1	Ground	0
17	AVMST	AVM start	0

FCE: P401			
No	Name	Function	V
18	SWC0	Serial data of the key status from the OPU	C
19	COM2	Analog ground	0
20	COM1	Ground	0
21	-5V	DC power	-5
22	+5V	DC power	5

7-1-2. FCE2 - FDU (PFC35/PFC45)

FCE: P402			
No	Name	Function	V
1	TXD	Transmit data	0
2	RXD	Receive data	0
3	RESET	Reset out	5
4	COM2	Ground	0
5	POC1	KFCP output port	0
6	ADSEL	SENS select signal	C
7	BAT	Battery power	5
8	SENS	SB-4 or SB-5	X
9	XVIDEO	Analog video signal	X
10	SH	Shift clock to CCD	C
11	LECOM0	Serial data of LED status from the OPU	5
12	LECOM1		5
13	VSEL0	Video gain control 0	5
14	VSEL1	Video gain control 1	5
15	PH	First phase transfer clock	C
16	DCCLP	DC restore request	C
17	PHRES	Reset clock (CCD output buffer)	C
18	BUZ	Buzzer drive signal	0
19	MSCK	Serial clock	5
20	MSOD	Serial output data	5
21	AVMEOS	AVM end of speech	5
22	no, connection	No connection	0

FCE: P401			
No	Name	Function	V
1	MONON	Monitor speaker on	0
2	TONSEL	Tone signal select	0
3	MONVOL	Speaker volume control	0
4	POA4	KFCP output port POA4	0
5	POA5	KFCP output port POA5	0
6	LEDON	LED array drive	0
7	POWON	24V power on signal	0
8	CK24V	24V detection	5
9	SB10	Cover open	0
10	PIA2	KFCP input port PIA2	*5

FCE: P401			
No	Name	Function	V
11	PIA3	KFCP input port PIA3	0
12	CBUS0	System command data bus	0
13	CBUS1		0
14	CBUS2		0
15	CBUS3		0
16	COM1	Ground	0
17	AVMST	AVM start	0
18	SWC0	Serial data of the key status from the OPU	0
19	COM2	Analog ground	0
20	COM1	Ground	0
21	-5V	DC power	-5
22	+5V	DC power	+5

7-1-3. FCE - Thermal Head

FCE: P403			
No	Name	Function	V
1	COM1	Ground	0
2	+5V	Power	5
3	THSEN	Thermistor input	X
4	STB3	Fourth strobe	5
5	STB2	Third strobe	5
6	STB1	Second strobe	5
7	STB0	First strobe	5
8	PRLAT	Print data latch pulse	5
9	PRDT	Print data	5
10	PRCLK	Print data sampling clock	5
11	PANK	T/H type or R rank input	0

7-1-4. FCE - OPU2 (PFC35/PFC45 only)

FCE: P404			
No	Name	Function	V
1	OPSCK	Serial shift clock	C
2	OPSID	Serial input data to FCE	C
3	OPSOD	Serial output data from FCE	C
4	+5V	+5V DC power	5
5	COM1	Ground	0
6	-5V	-5V DC power	-5

7-1-5. FCE1 - LIU (PFC15/PFC25)

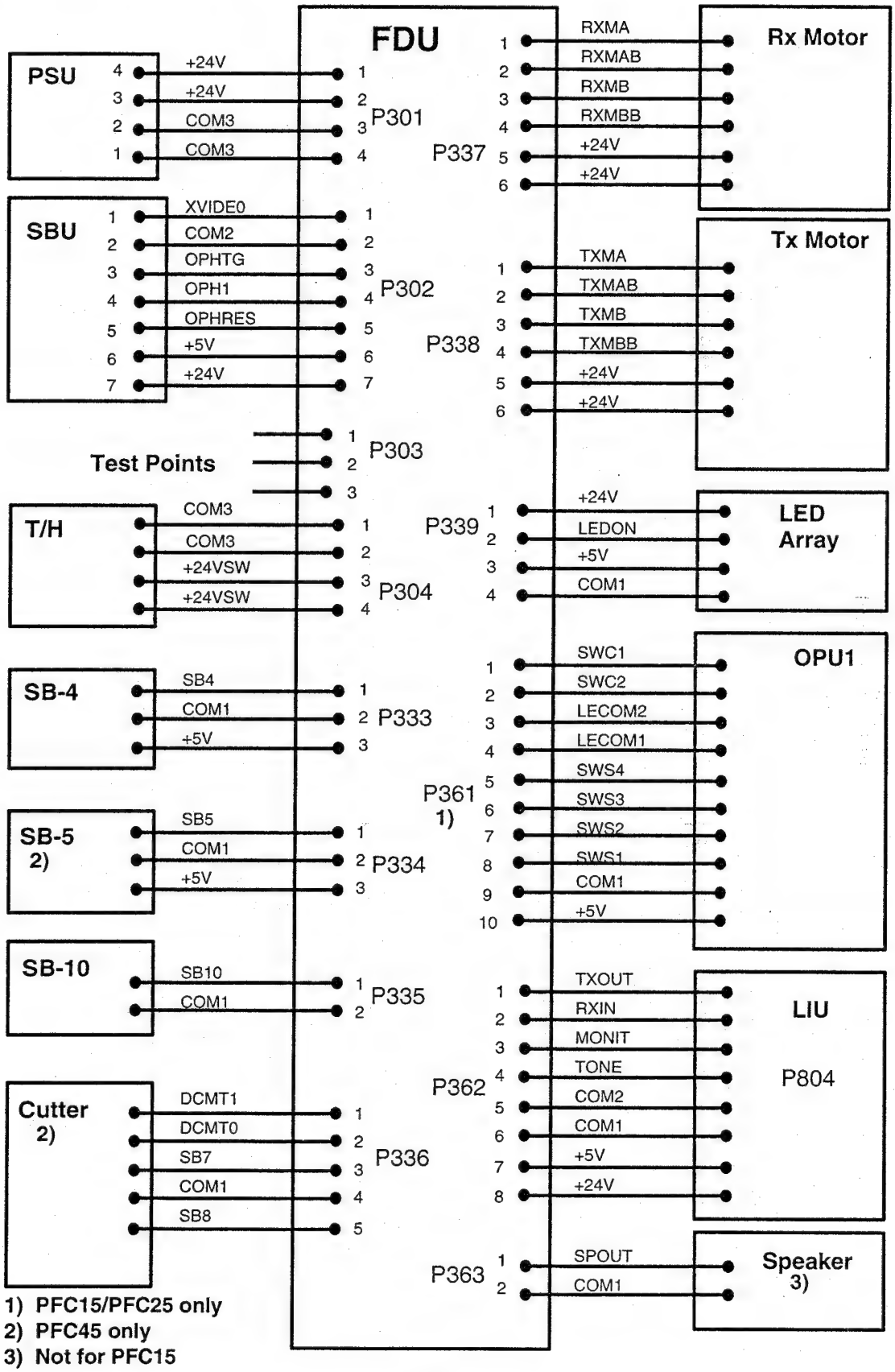
FCE: P431			
No	Name	Function	V
1	OH	OH relay control	0
2	ONHK	Internal tel on hook control	0
3	HOOK	Off hook detect	5
4	INTHK	Internal tel hook switch	0
5	RI	Ringing signal	5
6	CSL1	Country select 1	S
7	CSL2	Country select 2	S
8	CSL0	Country select 0	S
9	CSL3	Country select 3	S
10	COM1	Ground	0

7-1-6 FCE2 - LIU (PFC35/PFC45)

FCE: P431			
No	Name	Function	V
1	OH	OH relay control	0
2	ONHK	Internal tel on hook control	0
3	HOOK	Off hook detect	5
4	INTHK	Internal tel hook switch	0
5	RI	Ringing signal	5
6	LIUSOD	Serial output data from FCE	C
7	LIUSID	Serial input data to FCE	C
8	LIUSCK	Serial shift clock	C
9	COM1	Ground	0
10	COM1	Ground	0

Note: "V" is the level of the signal after power on.
C: Clock (0 - 5V)
X: Analog (0 - 5V)
S: Country code setting (0 - 5V)
L: Telephone line
1): Not for PFC15

7-2. CONNECTION FROM FDU



1) PFC15/PFC25 only
2) PFC45 only
3) Not for PFC15

7-2-1. FDU - PSU

FDU: P301			
No	Name	Function	V
1	+24V	DC power	24
2	+24V	DC power	24
3	COM3	Ground for +24V	0
4	COM3	Ground for +24V	0

7-2-2. FDU - SBU

FDU: P302			
No	Name	Function	V
1	XVIDEO	Analog video signal	X
2	COM2	Analog ground	0
3	OPHTG	Shift clock to CCD	C
4	OPH1	First phase transfer clock	C
5	OPHRES	Reset clock (CCD output buff.)	C
6	+5V	+5V DC power	5
7	+24V	DC power	24

7-2-3. Scanner Test Points

FDU: P303			
No	Name	Function	V
1	XVIDEO	Analog video	X
2	COM2	Ground	0
3	SHT	Shift clock to CCD	C

7-2-4. FDU - Thermal Head

FDU: P304			
No	Name	Function	V
1	COM3	Ground for +24V	0
2	COM3	Ground for +24V	0
3	+24VSW	Switched 24V	0
4	+24VSW	Switched 24V	0

7-2-5. FDU - FCE

P332: See FCE1 P402 (section 7-1-1)
See FCE2 P402 (section 7-1-2)

7-2-6. FDU - FCE

P331: See FCE1 P401 (section 7-1-1)
See FCE2 P401 (section 7-1-2)

7-2-7. FDU - Paper End Sensor (SB-4)

FDU: P333			
No	Name	Function	V
1	SB4	Signal from sensor	X
2	COM1	Ground	0
3	+5V	DC power	5

7-2-8. FDU - Paper Jam Sensor (SB-5) (PFC45 only)

FDU: P334			
No	Name	Function	V
1	SB5	Signal from sensor	X
2	COM1	Ground	0
3	+5V	DC power	5

7-2-9. FDU - Cover Sensor (SB-10)

FDU: P335			
No	Name	Function	V
1	SB10	Signal from sensor	0
2	COM1	Ground	0

7-2-10. FDU - Cutter (PFC45 only)

FDU: P336			
No	Name	Function	V
1	DCMT1	Cutter drive 1	0
2	DCMT0	Cutter drive 0	0
3	SB7	Signal from cutter end position sensor	5
4	COM1	Ground	0
5	SB8	Signal from cutter home position sensor	0

7-2-11. FDU - Rx Motor

FDU: P337			
No	Name	Function	V
1	RXMA	Rx motor phase A drive	24
2	RXMAB	Rx motor phase $\overline{A}$ drive	24
3	RXMB	Rx motor phase B drive	24
4	RXMBB	Rx motor phase $\overline{B}$ drive	24
5	+24V	+24V DC power	24
6	+24V	+24V DC power	24

7-2-12. FDU - Tx Motor

FDU: P338			
No	Name	Function	V
1	TXMA	Tx motor phase A drive	24
2	TXMAB	Tx motor phase $\overline{A}$ drive	24
3	TXMB	Tx motor phase B drive	24
4	TXMBB	Tx motor phase $\overline{B}$ drive,	24
5	+24V	+24V DC power	24
6	+24V	+24V DC power	24

7-2-13. FDU - LED Array

FDU: P339			
No	Name	Function	V
1	+24V	DC power	24
2	LEDON	LED array drive	15
3	+5V	DC power	5
4	COM1	Ground	0

7-2-14. FDU - OPU1 (PFC15/PFC25 only)

FDU: P361			
No	Name	Function	V
1	SWC1	Serial data of the key status from the OPU	C
2	SWC2		C
3	LECOM2	Serial data of LED status from the OPU	C
4	LECOM1		C
5	SWS4	Key data/select 4	C
6	SWS3	Key data/select 3	C
7	SWS2	Key data/select 2	C
8	SWS1	Key data/select 1	C
9	COM1	Ground	0
10	+5V	DC power	5

7-2-15. FDU - LIU

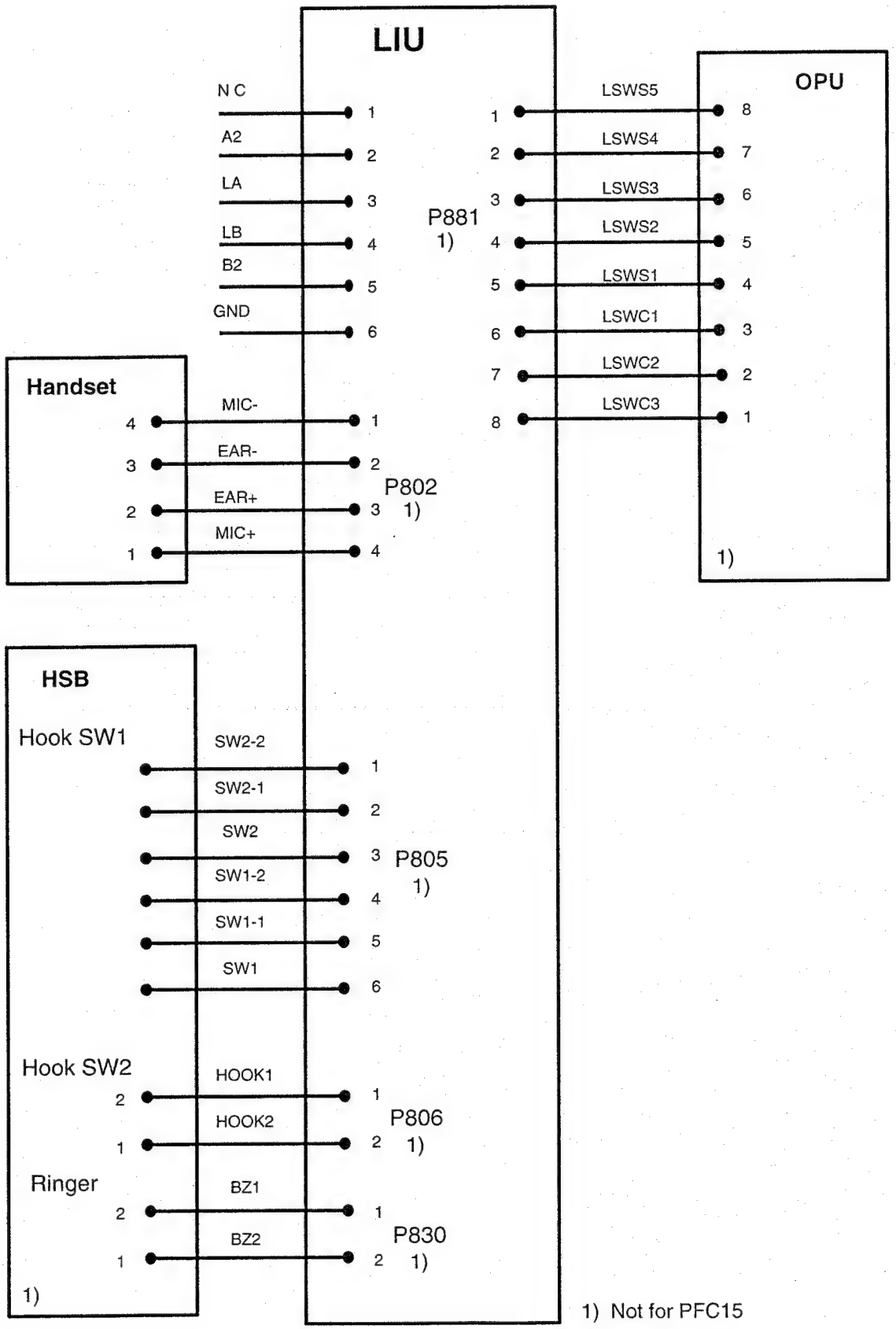
FDU: P362			
No	Name	Function	V
1	TXOUT	Transmit data	0
2	RXIN	Receive data	0
3	MONIT	Monitor input	0
4	TONE	Tone input	0
5	COM2	Analog ground	0
6	COM1	Ground	0
7	+5V	+5V DC power	5
8	+24V	DC power	24

7-2-16. FDU - Speaker (Not for PFC15)

FDU: P363			
No	Name	Function	V
1	SPOUT	Speaker out	0
2	COM1	Ground	0

Note: "V" is the level of the signal after power on.
C: Clock (0 - 5V)
X: Analog (0 - 5V)
S: Country code setting (0 - 5V)
L: Telephone line

7-3. CONNECTION FROM LIU



1) Not for PFC15

7-3-1. LIU - Line

LIU: P801			
No	Name	Function	V
1	no, connection	No connection	0
2	A2	External phone tip	L
3	LA	Phone line tip	L
4	LB	Phone line ring	L
5	B2	External phone ring	L
6	GND	Tel Ground	0

7-3-2. LIU - Handset (Not for PFC15)

LIU: P802			
No	Name	Function	V
1	MIC-	Microphone -	0
2	EAR-	Speaker -	0
3	EAR+	Speaker +	0
4	MIC+	Microphone +	0

7-3-3. LIU - FCE

P803: See FCE1 P431 (section 7-1-5).
See FCE2 P431 (section 7-1-6)

7-3-4. LIU - FDU

P804: See FDU P362 (section 7-2-15).

7-3-5. LIU - HSB (Hook Switch 1) (Not for PFC15)

LIU: P805			
No	Name	Function	V
1	SW2-2	Connection to the hand-set	0
2	SW2-1	Connection to the ring detection circuit	L
3	SW2	Connection from the line	L
4	SW1-2	Connection to the hand-set	0
5	SW1-1	Connection to the ring detection circuit	L
6	SW1	Connection from the line	L

7-3-6. LIU - HSB (Hook Switch 2) (Not for PFC15)

LIU: P806			
No	Name	Function	V
1	HOOK1	Handset off-hook	0
2	HOOK2	Ground	0

7-3-7. LIU - HSB (Ringer) (Not for PFC15)

LIU: P830			
No	Name	Function	V
1	BZ1	Ringer drive	0
2	BZ2	Ground	0

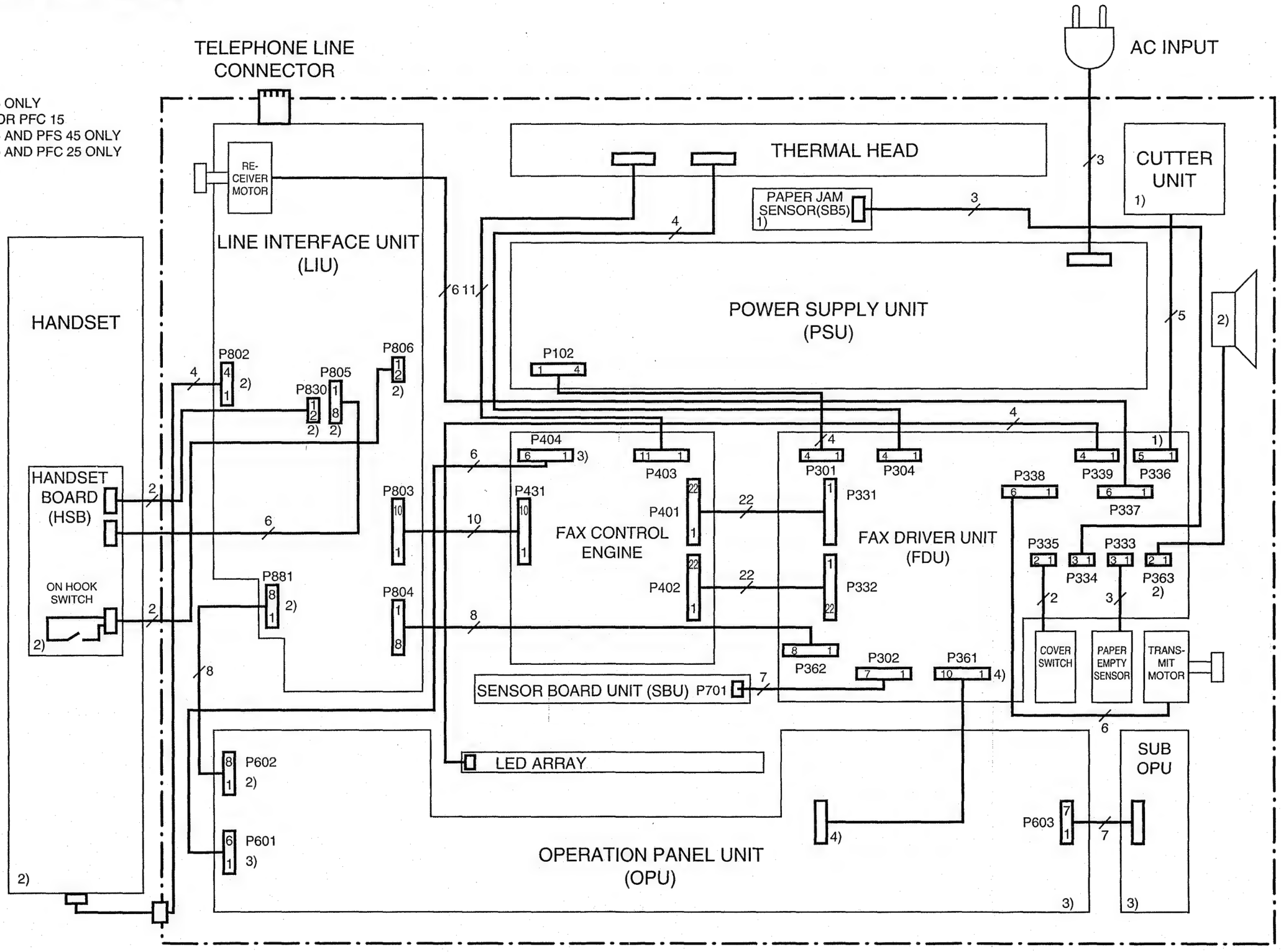
7-3-8. LIU - OPU Dialpad (Not for PFC15)

LIU: P881			
No	Name	Function	V
1	LSWS5	Key input	5
2	LSWS4	Key input	5
3	LSWS3	Key input	5
4	LSWS2	Key input	5
5	LSWS1	Key input	5
6	LSWC1	Common signal to the dialpad	C
7	LSWC2		C
8	LSWC3		C

Note: "V" is the level of the signal after power on.
C: Clock (0 - 5V)
X: Analog (0 - 5V)
S: Country code setting (0 - 5V)
L: Telephone line

7-4. OVERALL WIRING DIAGRAM

1) PFC 45 ONLY
2) NOT FOR PFC 15
3) PFC 35 AND PFS 45 ONLY
4) PFC 15 AND PFC 25 ONLY

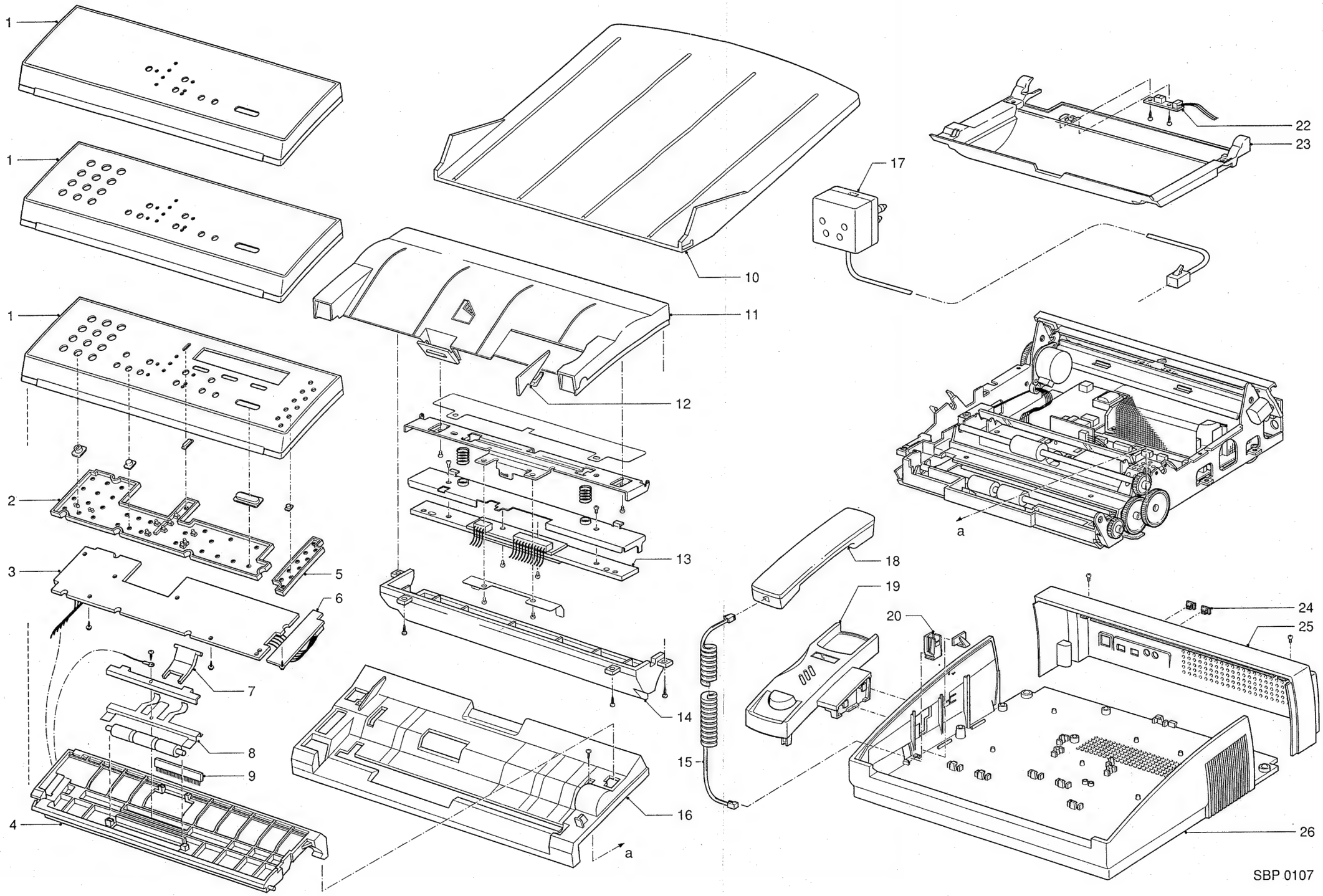


7.11 7.11

8. PARTS CATALOG

8-1. Mechanical parts.

1	4822 432 40209	Operation panel UK (PFC15)
	4822 432 40191	Operation panel D (PFC15)
	4822 432 40213	Operation panel UK (PFC25)
	4822 432 40192	Operation panel D (PFC25)
	4822 432 40214	Operation panel UK (PFC35)
	4822 432 40196	Operation panel D (PFC35)
	4822 432 40215	Operation panel UK (PFC45)
	4822 432 40221	Operation panel D (PFC45)
2	4822 466 50215	Rubber mat
3	4822 212 60153	Operation panel unit (PFC15,PFC25)
	4822 212 60163	Operation panel unit (PFC35,PFC45)
4	4822 432 40185	Operation panel bottom
5	4822 466 50216	Rubber mat (PFC35,PFC45)
6	4822 212 60164	Subprint OPU (PFC35,PFC45)
7	4822 404 60744	ADF-lip
8	4822 492 71129	ADF spring
9	4822 479 30149	Anti static brush
10	4822 432 40183	Paper tray
11	4822 432 40186	Plotter cover
12	4822 404 60741	Width guide
13	4822 212 60158	Thermal head
14	4822 432 40187	Thermal head cover
15	4822 321 61623	Handset cord (not for PFC15)
16	4822 432 40184	Scanner base cover
17	4822 321 61168	Telephone cord NL
	4822 321 61302	Telephone cord N, SF
	4822 321 61167	Telephone cord CH
	4822 321 61163	Telephone cord I
	4822 321 61166	Telephone cord A
	4822 321 61401	Telephone cord B
	4822 321 61162	Telephone cord D
	4822 321 61169	Telephone cord S
	4822 321 61301	Telephone cord DK
19	4822 242 10216	Handset (not for PFC15)
20	4822 432 40217	Cradle assy (not for PFC15)
21	4822 321 61679	Cable connector (not for PFC15)
22	4822 130 83055	Paper empty sensor
24	4822 256 91927	Paper holder
25	4822 411 61878	Switch button
26	4822 432 40182	Rear cover
27	4822 432 40189	Bottom cover (PFC15)
	4822 432 40193	Bottom cover (PFC25,PFC35,PFC45)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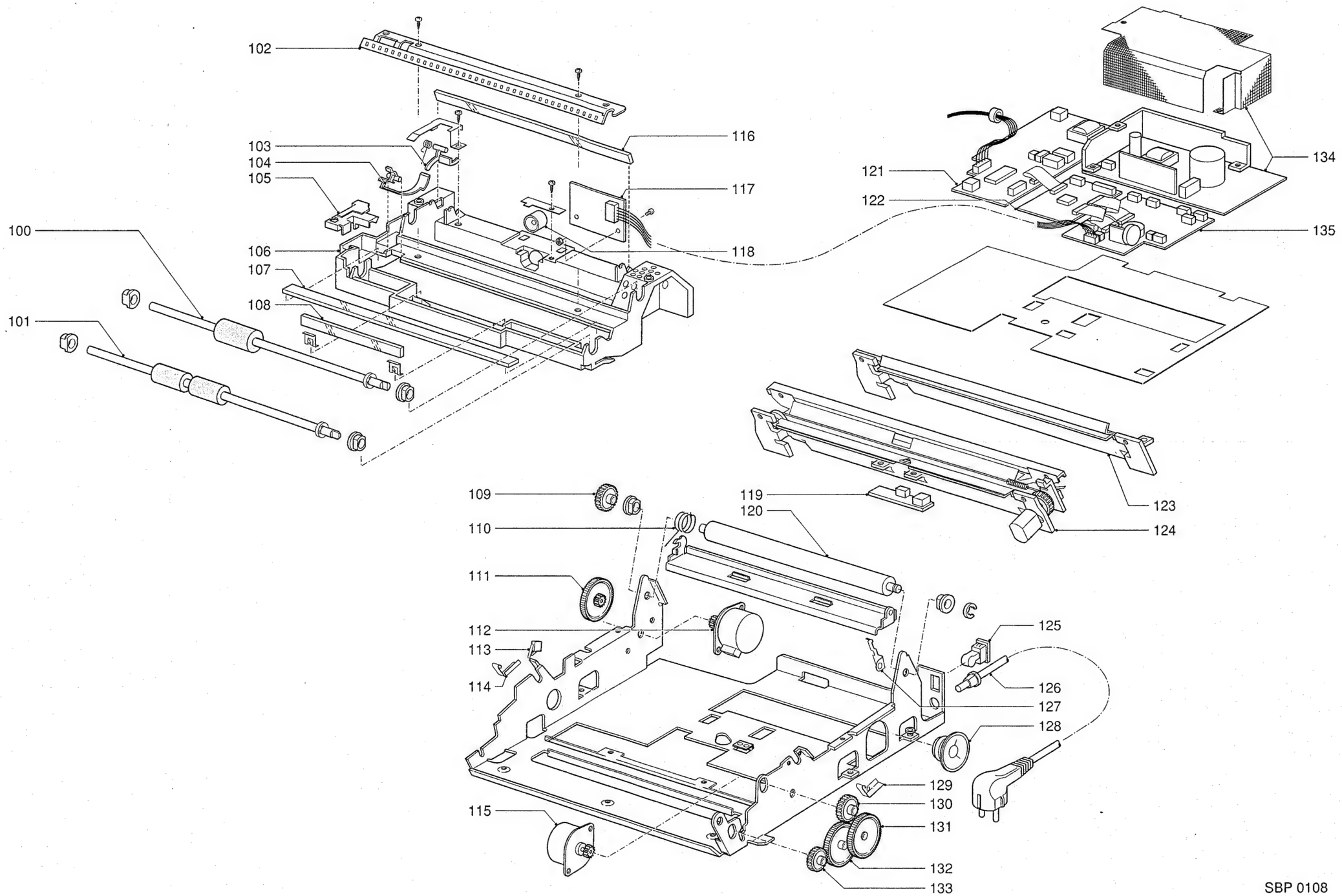
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SBP 0108

8.2

100	4822 528 70798	ADF Roller
101	4822 528 70797	Feed roller
102	4822 212 60151	LED array
103	4822 404 60742	Lever SB1
104	4822 404 60743	Lever SB2
105	4822 432 40224	Cover
106	4822 464 90743	Scanner frame
107	4822 380 30309	Mirror
108	4822 380 30312	Mirror
109	4822 522 33271	Gear
110	4822 492 52319	Decurler spring (PFC45 only)
111	4822 522 33268	Gear
112	4822 361 21534	RX motor
113	4822 271 30775	Paper cover switch
114	4822 492 71167	Spring left
115	4822 361 21535	TX motor
116	4822 380 30311	Mirror
117	4822 212 60154	SBU
118	4822 381 11332	Lens
119	4822 130 83055	Paper sensor (PFC45 only)
120	4822 528 70799	Platen roller
121	4822 212 60169	LIU0 NL (PFC15)
	4822 212 60157	LIU0 D (PFC15)
	4822 212 60171	LIU0 I (PFC15)
	4822 212 60186	LIU0 A (PFC15)
	4822 212 60155	LIU1 D (PFC25)
	4822 212 60174	LIU1 I (PFC25)
	4822 212 60184	LIU1 A (PFC25)
	4822 212 60175	LIU2 NL (PFC35;PFC45)
	4822 212 60165	LIU2 D (PFC35,PFC45)
	4822 212 60185	LIU2 A (PFC35,PFC45)
	4822 212 60176	LIU2 I (PFC35,PFC45)
122	4822 212 60152	FCE1 (without ROM) (PFC15,PFC25)
	4822 212 60159	FCE2 (without ROM) (PFC35,PFC45)
123	Not coded	Bracket for PFC15,PFC25,PFC35
124	4822 693 91541	Cutter unit (PFC45 only)
125	4822 277 11393	Switch
126	4822 321 10864	Power cable
127	4822 492 71131	Blade spring
128	4822 240 30629	Loudspeaker (not for PFC15)
129	4822 492 71168	Spring right
130	4822 522 33272	Gear ADF roller
131	4822 522 33269	Gear
132	4822 522 33268	Gear
133	4822 522 33267	Gear
134	4822 212 60149	Power supply
135	4822 212 60156	FDU1A (PFC15,PFC25 /02/03/06/09/10)
	4822 212 60177	FDU1B (PFC15,PFC25 /04/13/14/20)
	4822 212 60178	FDU1C (PFC15,PFC25 /08/16/17)
	4822 212 60161	FDU2A (PFC35 /02/03/06/09/10)
	4822 212 60179	FDU2B (PFC35 /04/13/14/20)
	4822 212 60181	FDU2C (PFC35 /08/16/17)
	4822 212 60162	FDU3A (PFC45 /02/03/06/09/10)
	4822 212 60182	FDU3B (PFC45 /04/13/14/20)
	4822 212 60183	FDU3C (PFC45 /08/16/17)

8-2. ELECTRICAL PARTS LIST

POWER SUPPLY

	4822 212 60149	Power supply
Various		
F101	4822 071 54002	Fuse TR5-T
TR101	4822 146 21676	Transformer
TS101	4822 130 63066	Transistor IRFPE 40

LIU0 (PFC15)

	4822 212 60169	LIU0 NL
	4822 212 60157	LIU0 D
	4822 212 60171	LIU0 I
	4822 212 60186	LIU0 A
Various		
P801	4822 267 40989	Tel. Jack 6-pol

LIU1 (PFC25)

	4822 212 60155	LIU1 D
	4822 212 60174	LIU1 I
	4822 212 60184	LIU1 A
Various		
P801	4822 267 40989	Tel. Jack 6-pol
R808	4822 100 20864	Potmeter 100k
R867	4822 100 20865	Potmeter 20k
SW880	4822 277 21614	Switch
SW880	4822 277 21614	Switch

LIU2 (PFC35/PFC45)

	4822 212 60175	LIU2 NL
	4822 212 60165	LIU2 D
	4822 212 60185	LIU2 A
	4822 212 60176	LIU2 I
Various		
P801	4822 267 40989	Tel. Jack 6-pol
R808	4822 100 20864	Potmeter 100k
R867	4822 100 20865	Potmeter 20k
SW880	4822 277 21614	Switch
SW881	4822 277 21614	Switch

OPU (PFC15/PFC25)

	4822 212 60153	Operation panel unit

OPU (PFC35/PFC45)

	4822 212 60163	Operation panel unit

FCE1 (PFC15/PFC25)

	4822 212 60152	FCE1 (without ROM)
Various		
IC401	4822 209 52337	ROM

FCE2 (PFC35/PFC45)

	4822 212 60159	FCE2 (without ROM)
Various		
IC401	4822 209 52338	ROM for /02/03/05 /06/07/08/09/10/16/17
IC401	4822 209 52344	ROM for /04/13/14/20

FDU1 (PFC15/PFC25)

	4822 212 60156	FDU1A for /02/03/06/09/10
	4822 212 60177	FDU1B for /04/13/14/20
	4822 212 60178	FDU1C for /08/16/17

FDU2 (PFC35)

	4822 212 60161	FDU2A for /02/03/06/09/10
	4822 212 60179	FDU2B for /04/13/14/20
	4822 212 60181	FDU2C for /08/16/17

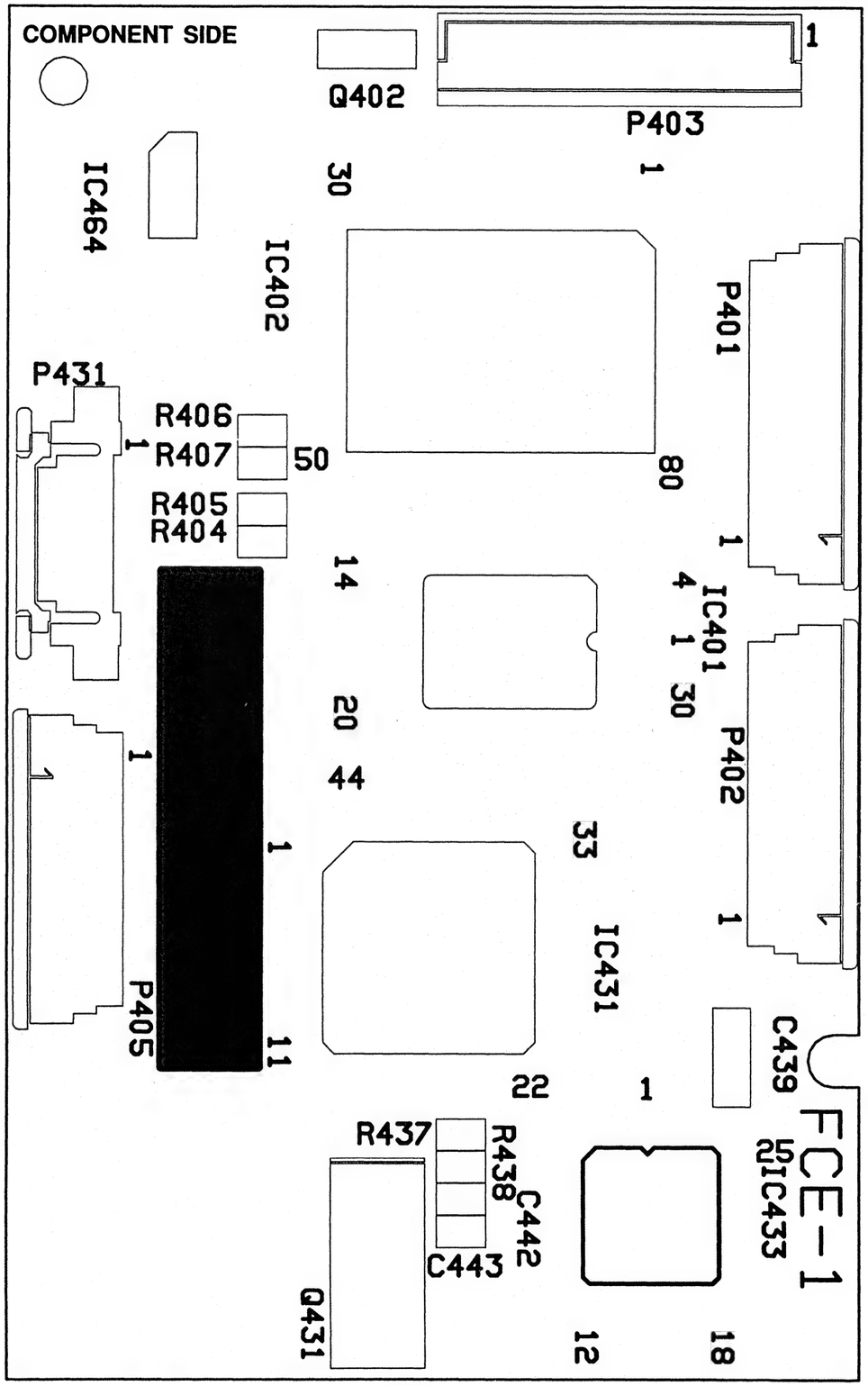
FDU3 (PFC45)

	4822 212 60162	FDU3A for /02/03/06/09/10
	4822 212 60182	FDU3B for /04/13/14/20
	4822 212 60183	FDU3C for /08/16/17

9. DIAGRAMS

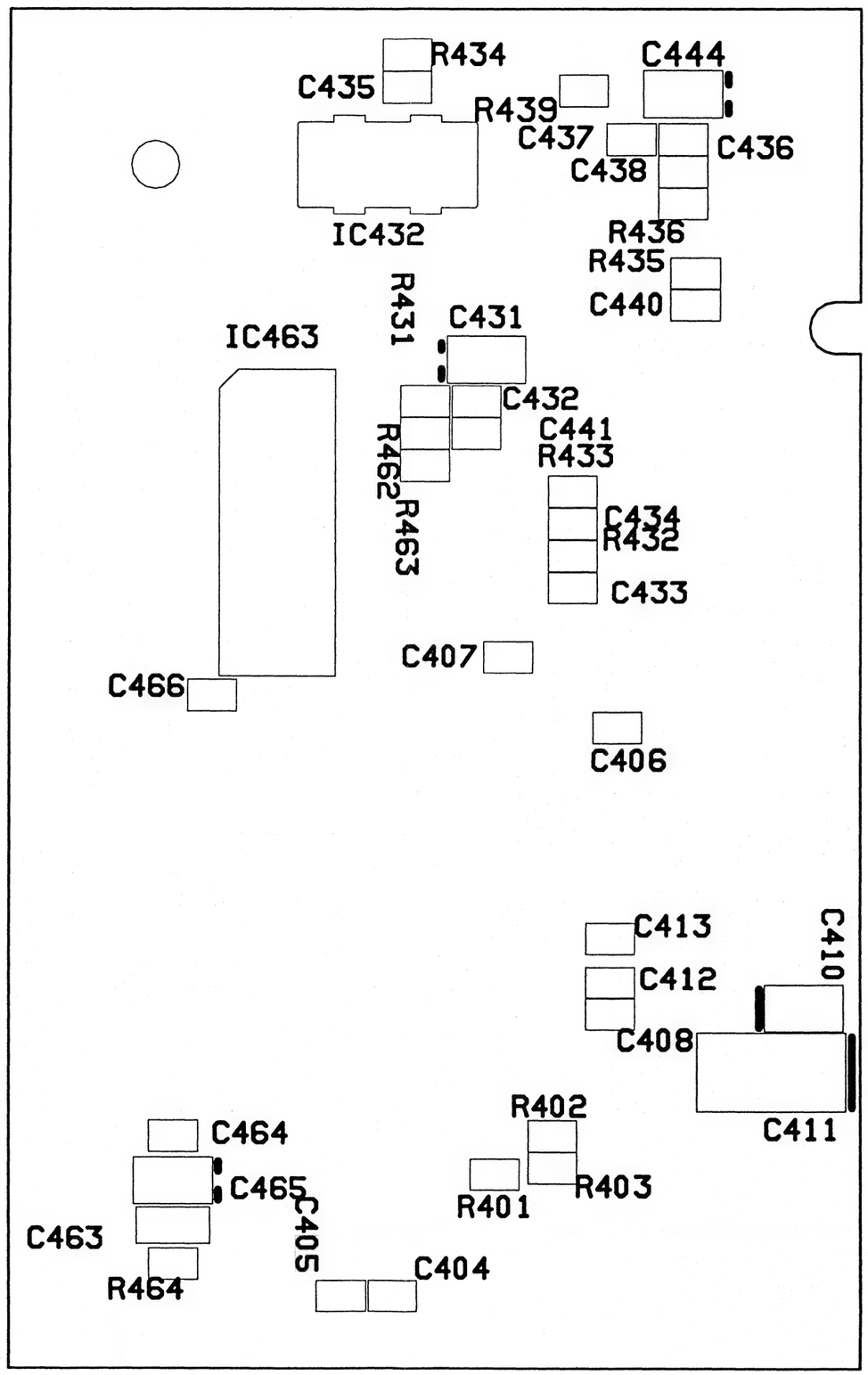
9-1. COMPONENT LAYOUT FCE1 (PFC15,PFC25)

COMPONENT SIDE



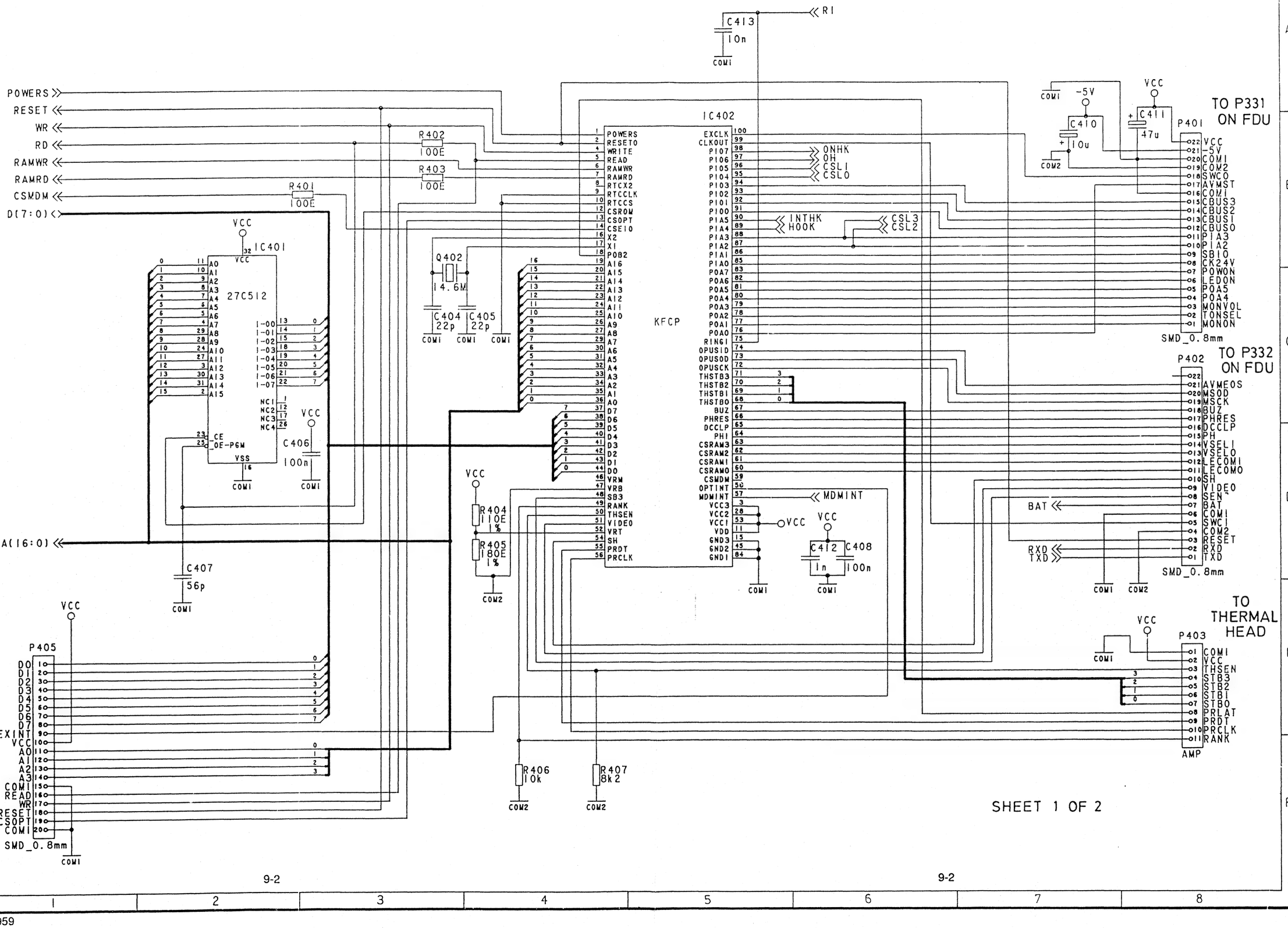
9-1

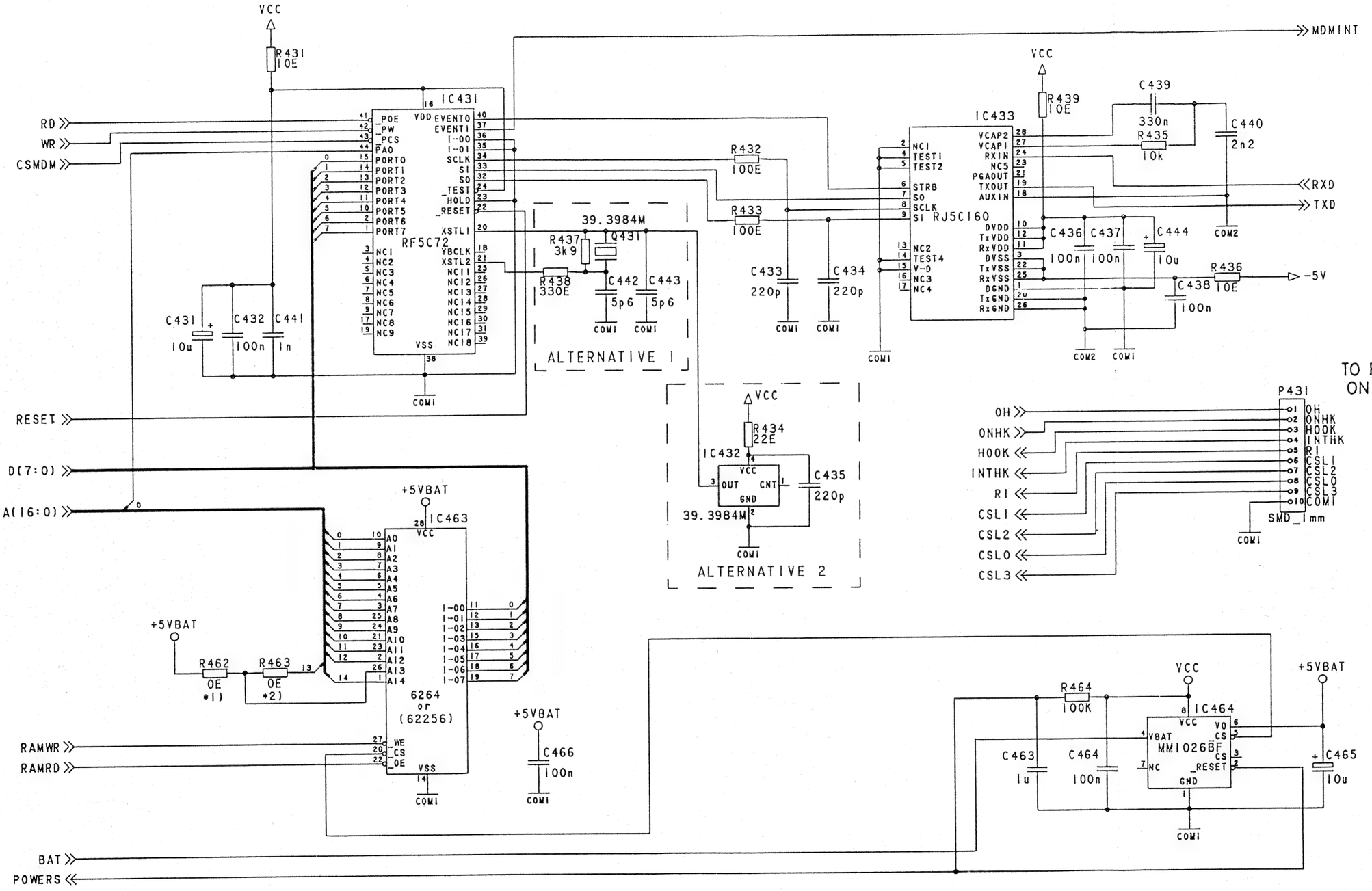
SOLDER SIDE



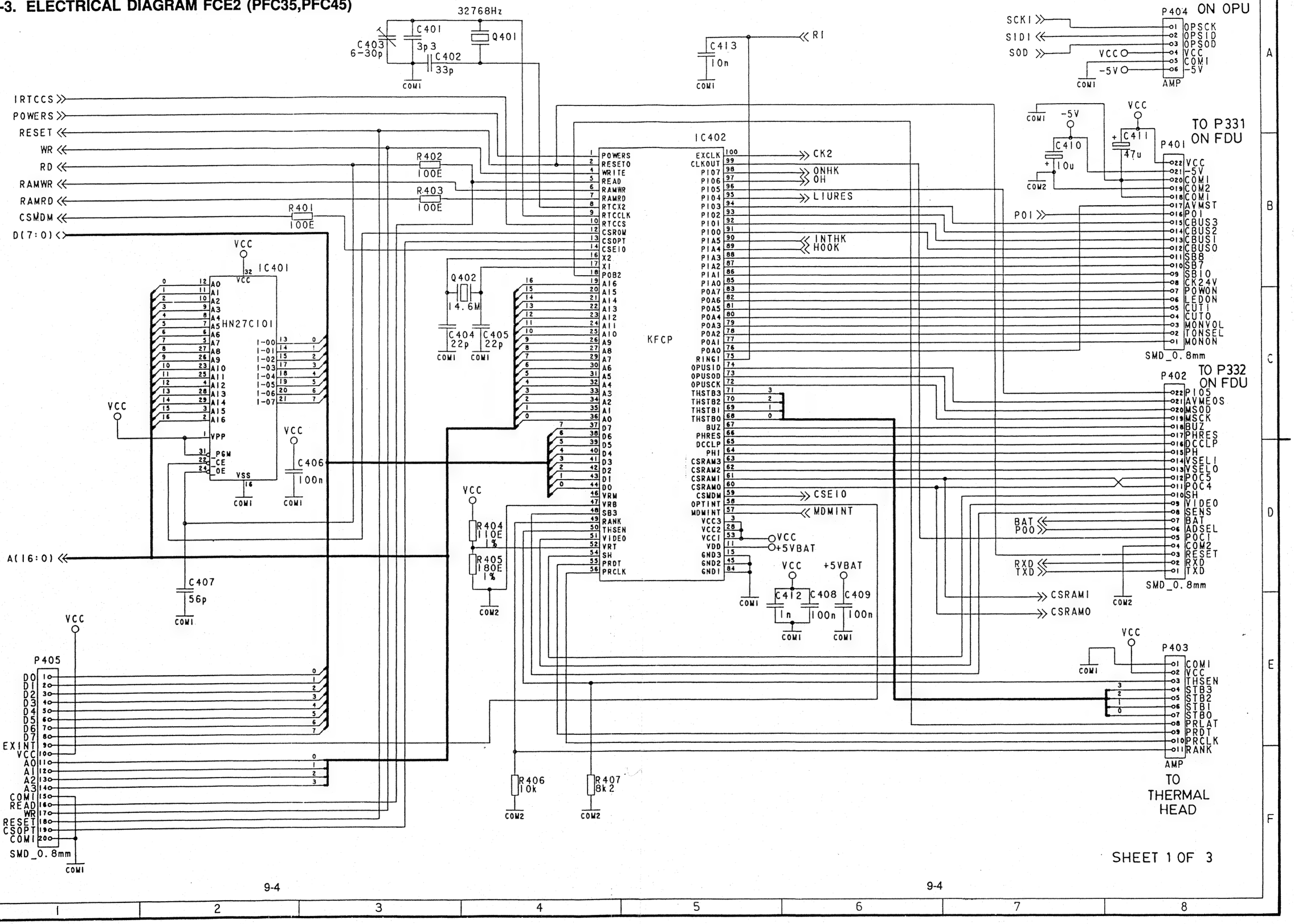
9-1

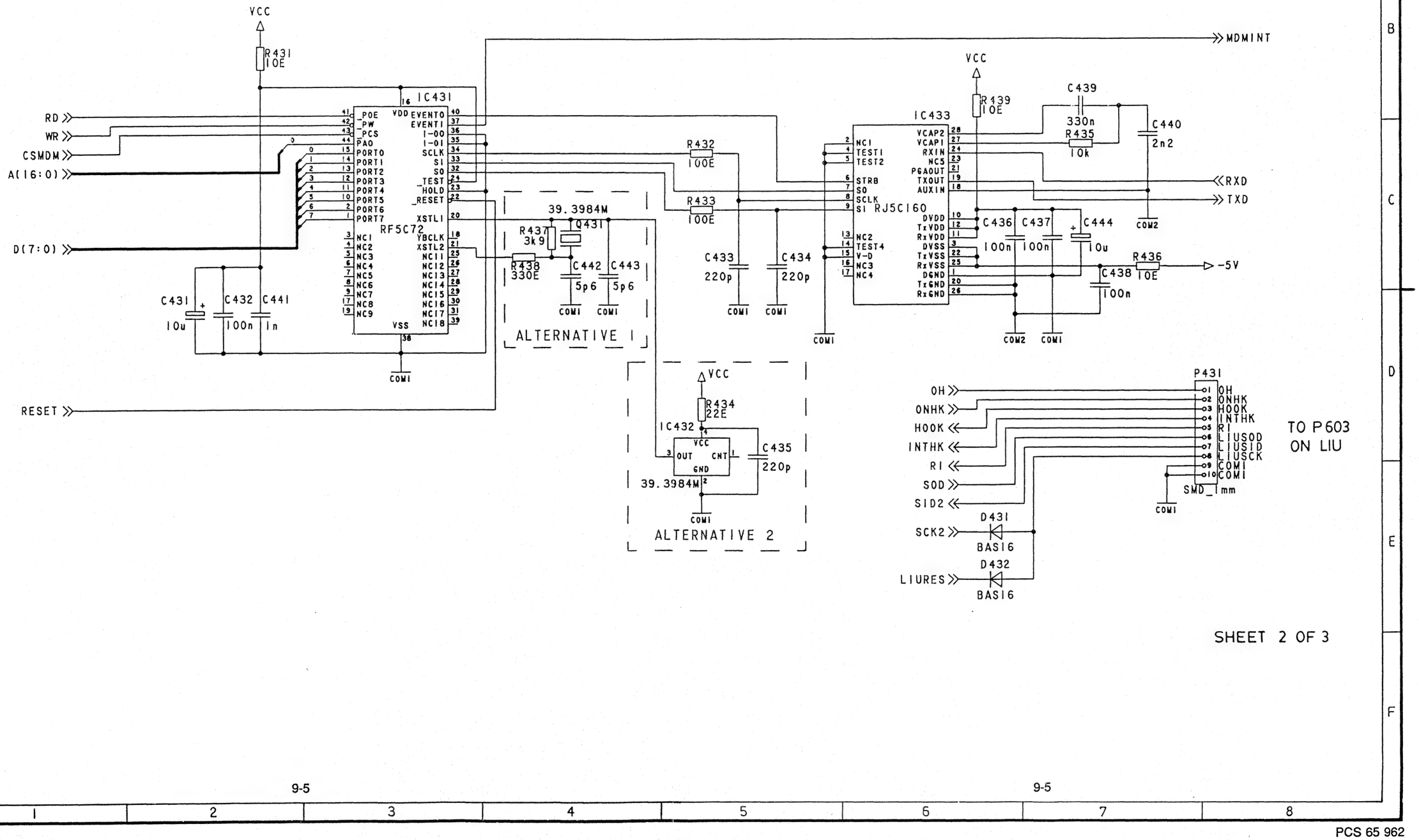
9-2. ELECTRICAL DIAGRAM FCE1 (PFC15,PFC25)




VCC
R431 10E
RD
WR
CSMDM
IC431
RF5C72
_POE
_PW
_PCS
PA0
PORT0
PORT1
PORT2
PORT3
PORT4
PORT5
PORT6
PORT7
NC1
NC2
NC3
NC4
NC5
NC6
NC7
NC8
NC9
VDD
EVENT0
EVENT1
I--00
I--01
SCLK
SI
SO
_TEST
HOLD
_RESET
XSTLI
YBCLK
XSTL2
NCI1
NCI2
NCI3
NCI4
NCI5
NCI6
NCI7
NCI8
VSS
COM1
C431 10u
C432 100n
C441 1n
39.3984M
Q431
R437 3k9
R438 330E
C442 5p6
C443 5p6
ALTERNATIVE 1
R432 100E
R433 100E
C433 220p
C434 220p
MDMINT
RXD
TXD
-5V
IC433
NCI
TESTI
TEST2
STRB
SO
SCLK
SI RJ5C160
NC2
TEST4
V-D
NC3
NC4
VCAP2
VCAP1
RXIN
NC5
PGAOUT
TXOUT
AUXIN
DVDD
TxVDD
RxVDD
DVSS
TxVSS
RxVSS
DGND
TxGND
RxGND
R439 10E
C439 330n
R435 10k
C440 2n2
C436 100n
C437 100n
C444 10u
C438 100n
R436 10E
COM2
TO P803
ON LIU
P431
OH
ONHK
HOOK
INTHK
RI
CSLI
CSL2
CSLO
CSL3
COMI
SMD_1mm
RESET
D(7:0)
A(16:0)
+5VBAT
IC463
AO
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
A13
A14
I-00
I-01
I-02
I-03
I-04
I-05
I-06
I-07
R462 0E *1)
R463 0E *2)
6264 or (62256)
WE
CS
OE
VSS
RAMWR
RAMRD
C466 100n
IC432
R434 22E
C435 220p
39.3984M
ALTERNATIVE 2
R464 100K
IC464
MM1026BF
VBAT
VO
NC
_RESET
C463 1u
C464 100n
C465 10u
BAT
POWERS
*1) if 6264 RAM is used
*2) if 62256 RAM is used
SHEET 2 OF 2

9-3. ELECTRICAL DIAGRAM FCE2 (PFC35,PFC45)

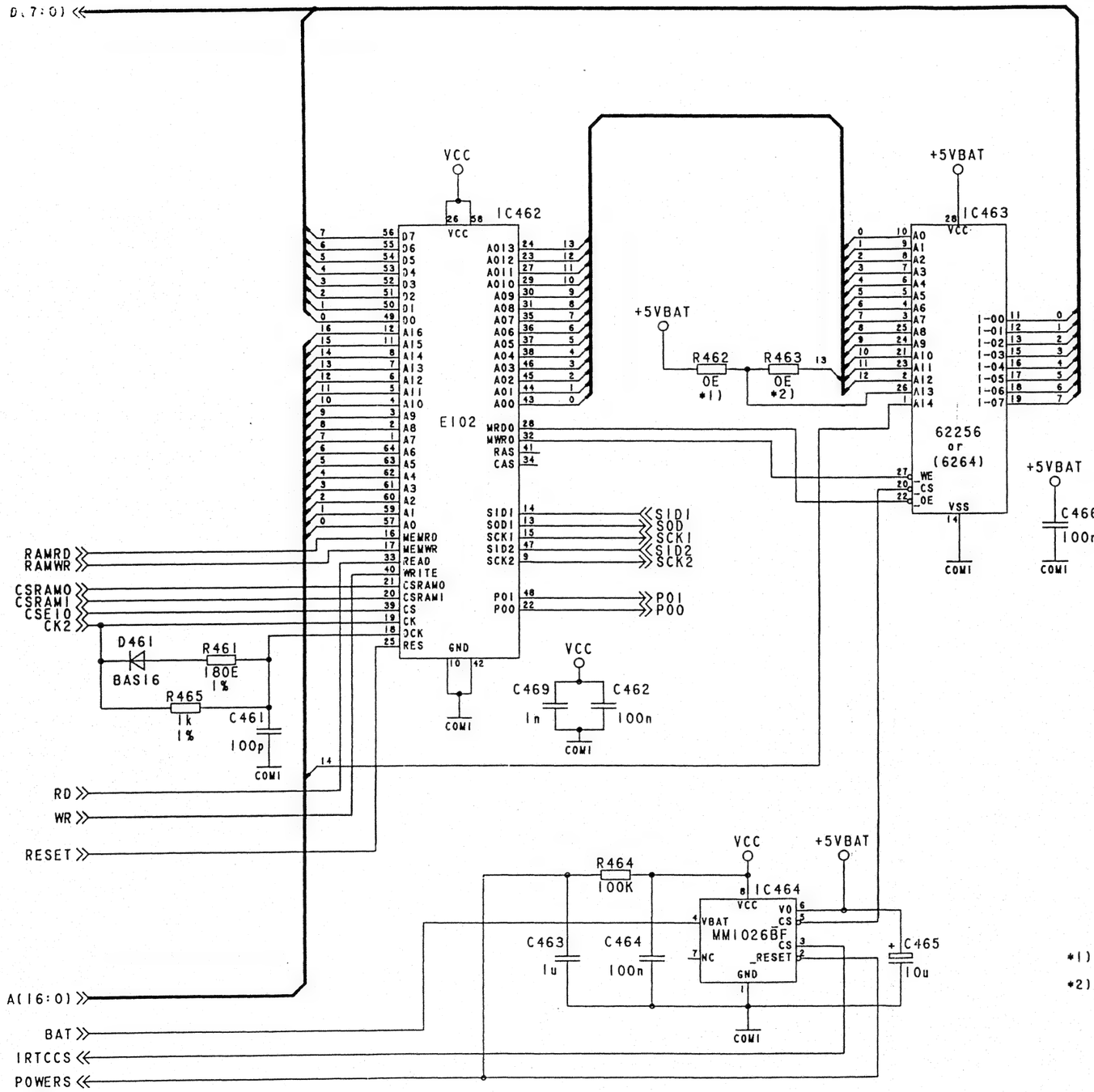




9-5

9-5

PCS 65 962



*1) if 6264 RAM is used

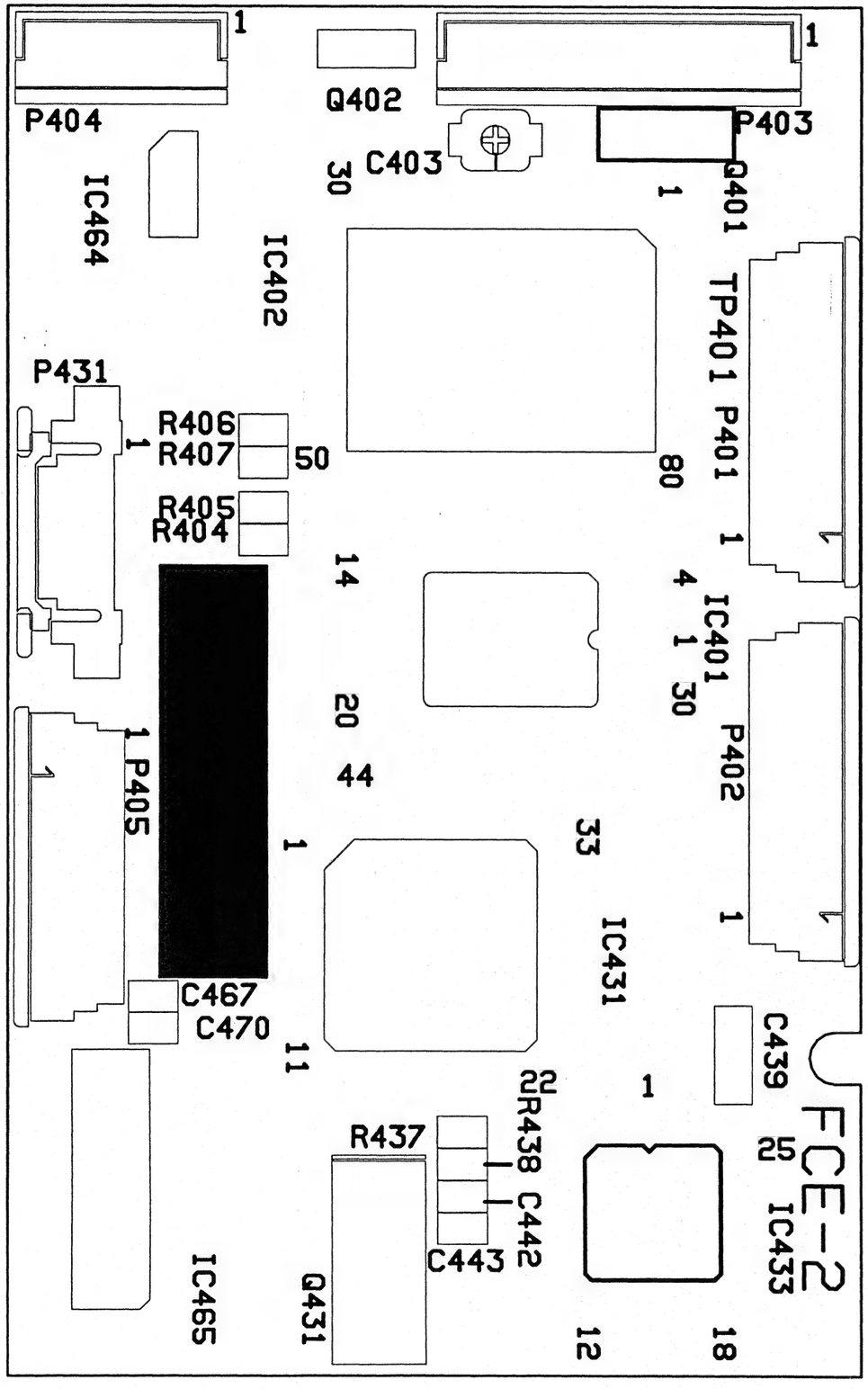
*2) if 62256 RAM is used

SHEET 3 OF 3

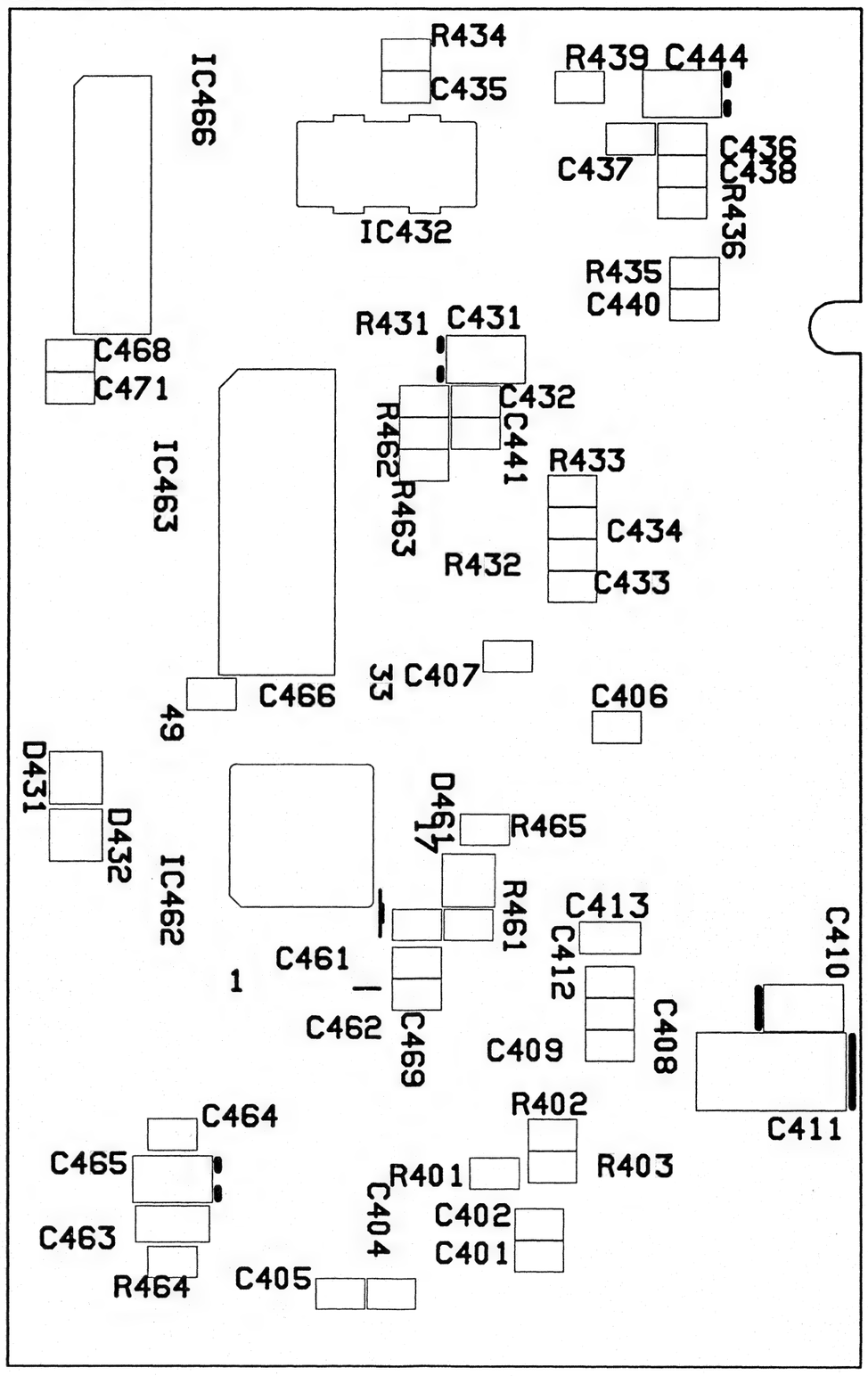
9-6

9-4. COMPONENT LAYOUT FCE2 (PFC35,PFC45)

COMPONENT SIDE

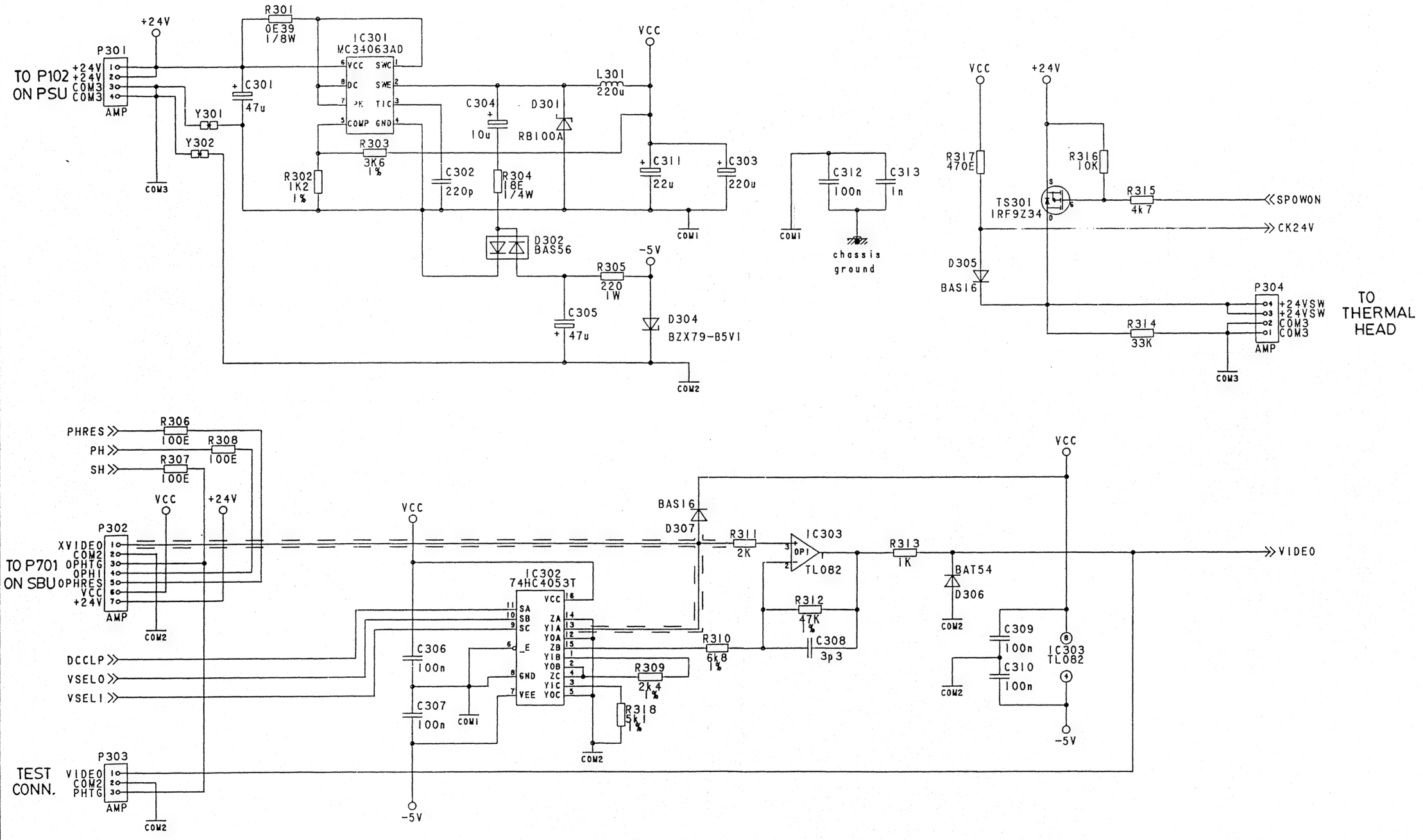


SOLDER SIDE



9-7

9-5. ELECTRICAL DIAGRAM FDU



SHEET 1 OF 3

TO P402
ON FCE

P332
STXD 22 → STXD
SRXD 21 ← SRXD
RESET 20
COM2 19
SWCI 18 → SWCI
ADSEL 17
BAT 16
SENS 15
VIDEO 14 ← VIDEO
SH 13 → SH
LECOMO 12 → LECOMO
LECOMI 11 → LECOMI
VSELO 10 → VSELO
VSELI 9 → VSELI
PH 8 → PH
DCCLP 7 → DCCLP
PHRES 6 → PHRES
BUZ 5
MSCK 4
MSOD 3
AVMEOS 2 ← AVMEOS
P105 1
SMD_0.8mm

P331
MONON 22 → MONON
TONSEL 21 → TONSEL
MONVOL 20 → MONVOL
CUTO 19
CUTI 18
LEDON 17
POWON 16
CK24V 15 ← CK24V
SBIO 14
SB7 13
SBB 12
CBUS0 11 ↔ CBUS0
CBUSI 10 ↔ CBUS1
CBUS2 9 ↔ CBUS2
CBUS3 8 ↔ CBUS3
PO1 7
AVMST 6 → AVMST
SWCO 5 → SWCO
COM2 4
COMI 3
-5V 2
VCC 1
SMD_0.8mm

TO P401
ON FCE

P335
SBIO 1
COMI 2
AMP
cover switch

P333
SB4 1
SB4C 2
VCC 3
AMP
paper end

P334
SB5 1
SB5C 2
VCC 3
AMP
paper jam

R341 4k7 (VCC)
R344 5k6
R345 200E
R346 5k6
R347 200E
R331 10k
BT331 3V
OE R332 *4)

IC331 74HC164T
VCC 14
WR 9
CP 8
DSI 1
DS2 2
GND 7
Q0 3
Q1 4
Q2 5
Q3 6
Q4 10
Q5 11
Q6 12
Q7 13

IC332 74HC4053T
VCC 16
SA 11
SB 10
SC 9
E 6
GND 8
VEE 7
ZA 14
YIA 13
YOA 12
ZB 15
YIB 1
YOB 2
ZC 4
YIC 3
YOC 5

R342 1k5
R343 1k
TS331 2SD1368
*1)

IC335 ULN2003A
IC334 ULN2003A
COM 9
01 16
02 15
03 14
04 13
05 12
06 11
07 10
GND 8
R348 0E
R333 330E 1W *2)
R349 0E *1)
R334 330E 1W
C336 100n
C335 100n
R338 180E
R337 10k
BZ331 buzzer

P339
1 +24V
2 LED_ON
3 VCC
4 COMI
AMP
TO LED ARRAY

P338
1 TXMA
2 TXMAB
3 TXMB
4 TXMBB
5 +24V
6 +24V
AMP
TO TRANSMIT MOTOR

P337
1 RXMA
2 RXMAB
3 RXMB
4 RXMBB
5 +24V
6 +24V
AMP
TO RECEIVE MOTOR

IC333 TA7291S
IN2 12
IN1 11
NC 4
GND 5
O2 3
O1 7
VCC 2
VS 6
VREF 8
R335 2k2
R336 10k
C334 100n
R339 10k
R340 10k

P336
1 DCMTI
2 DCMTO
3 SB7
4 COMI
5 SB8
AMP
TO CUTTER MOTOR

C331 100n
C332 100n
C333 100n

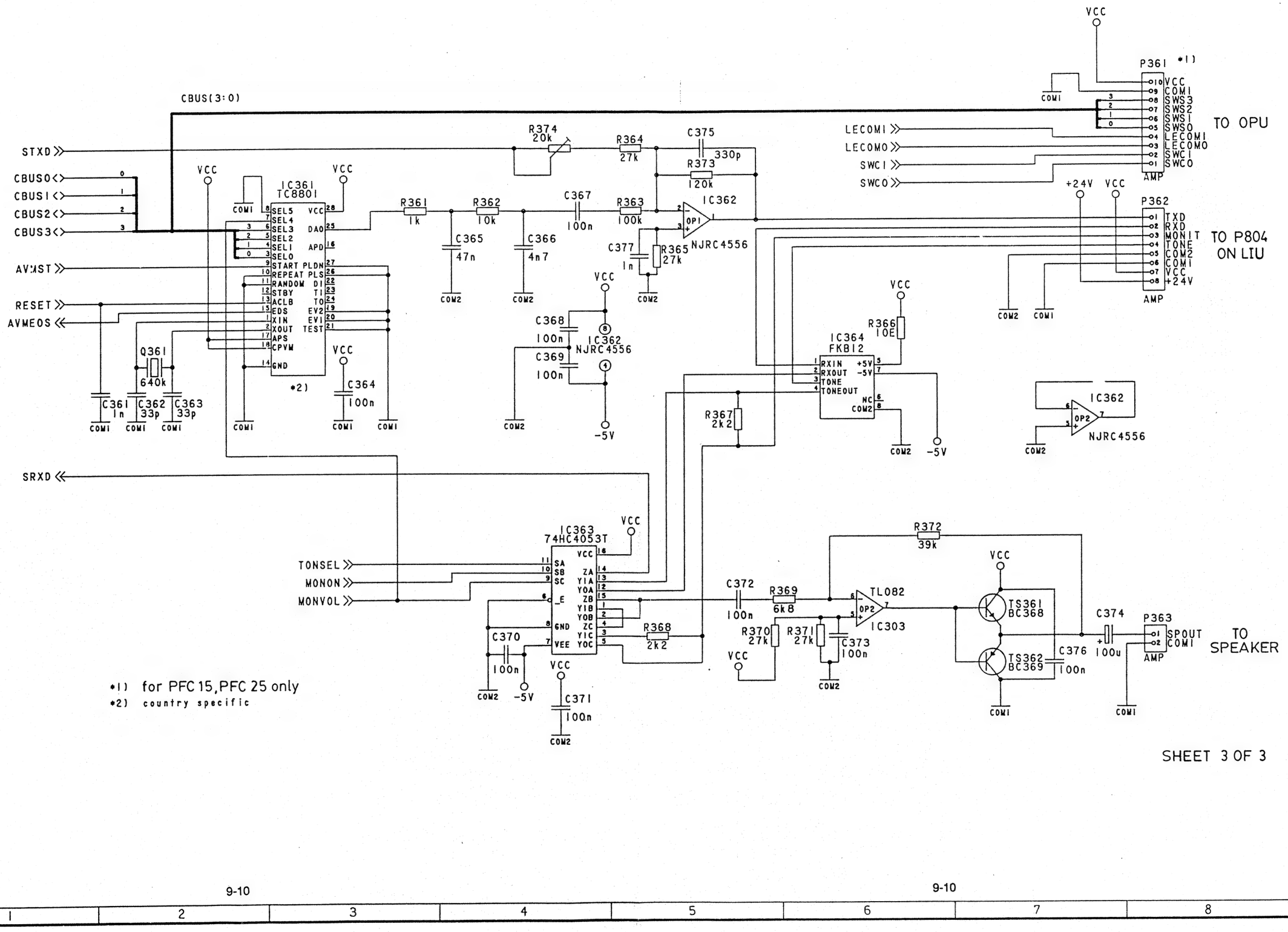
*1) R349 or R342, R343, TS 331 are assembled
*2) R348 or R333 are assembled
*3) only for PFC45
*4) not for PFC45

*3)

SHEET 2 OF 3

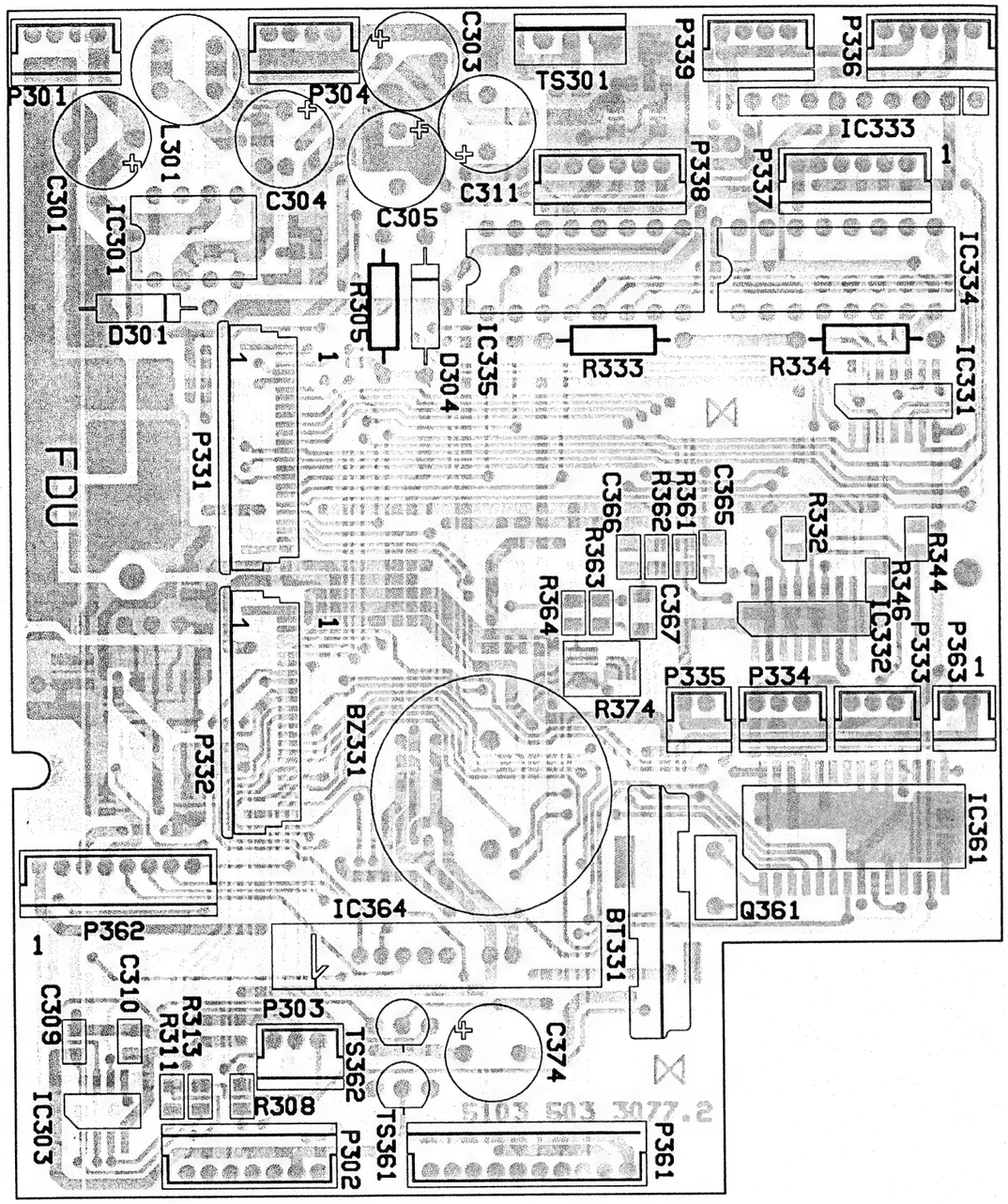
9-9

PCS 65 966


CBUS(3:0)
STXD
CBUS0
CBUS1
CBUS2
CBUS3
AVRST
RESET
AVMEOS
SRXD
TONSEL
MONON
MONVOL
IC361
TC8801
SEL5
SEL4
SEL3
SEL2
SEL1
SEL0
START
REPEAT
RANDOM
STBY
ACLB
EDS
XIN
XOUT
APS
CPVM
GND
VCC
DAO
APD
PLDN
PLS
DI
TI
TO
EV2
EVI
TEST
Q361
640k
C361 1n
C362 33p
C363 33p
C364 100n
R361 1k
R362 10k
C365 47n
C366 4n7
C367 100n
R363 100k
R374 20k
R364 27k
C375 330p
R373 120k
IC362
OP1
NJRC4556
C377 1n
R365 27k
C368 100n
C369 100n
IC362
NJRC4556
IC364
FKB12
RXIN
RXOUT
TONE
TONEOUT
+5V
-5V
NC
R366 10E
R367 2k2
IC362
OP2
NJRC4556
P361 *1)
AMP
LECOMI
LECOMO
SWCI
SWCO
SWS3
SWS2
SWSI
SWSO
TO OPU
+24V
P362
TXD
RXD
MONIT
TONE
COM2
COMI
TO P804 ON LIU
IC363
74HC4053T
SA
SB
SC
_E
GND
VEE
ZA
YIA
YOA
ZB
YIB
YOB
ZC
YIC
YOC
R368 2k2
C370 100n
C371 100n
R372 39k
C372 100n
R369 6k8
TL082
OP2
IC303
R370 27k
R371 27k
C373 100n
TS361 BC368
TS362 BC369
C376 100n
C374 100u
P363
SPOUT
COMI
AMP
TO SPEAKER
*1) for PFC 15, PFC 25 only
*2) country specific
SHEET 3 OF 3

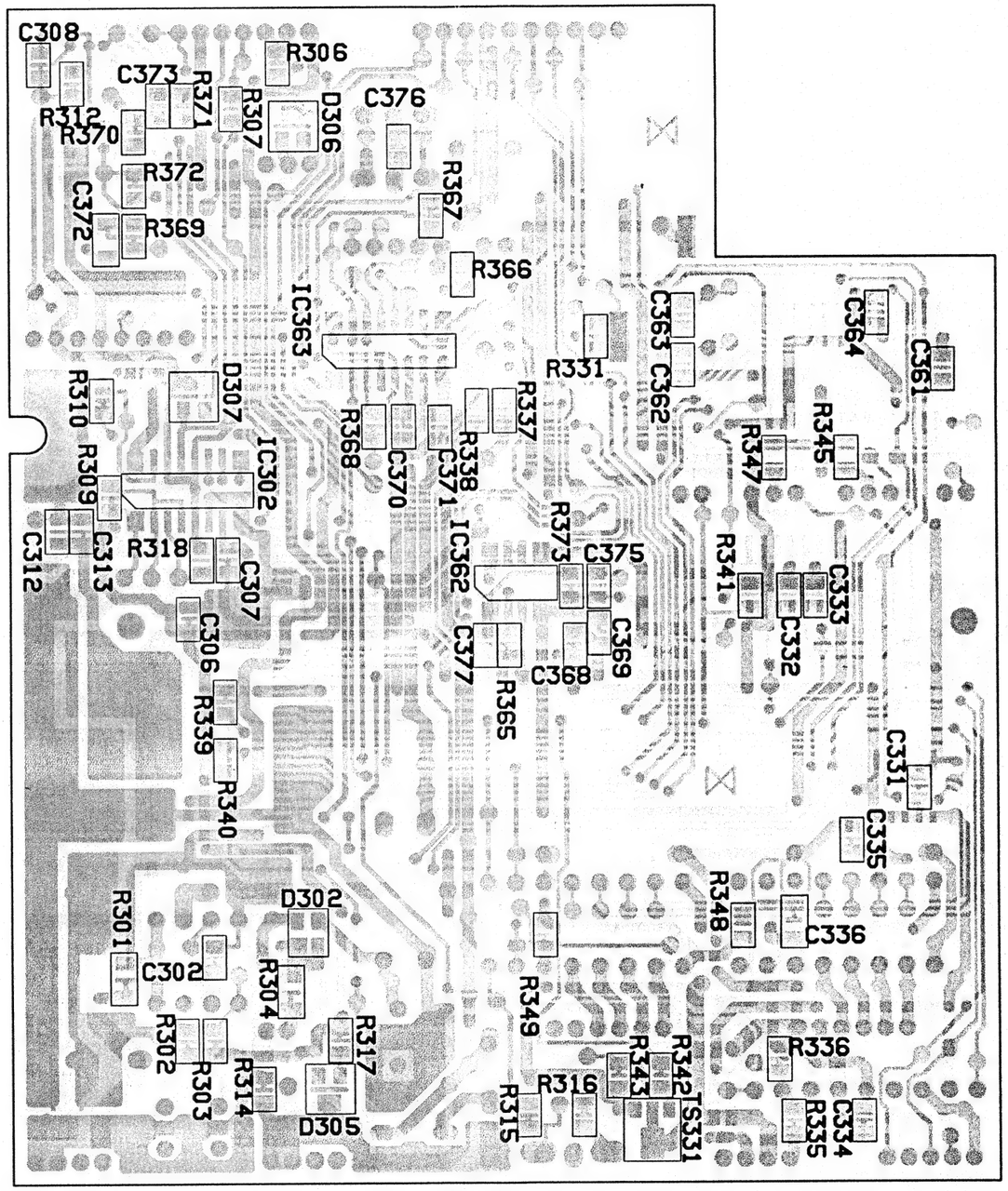
9-6. COMPONENT LAYOUT FDU

COMPONENT SIDE



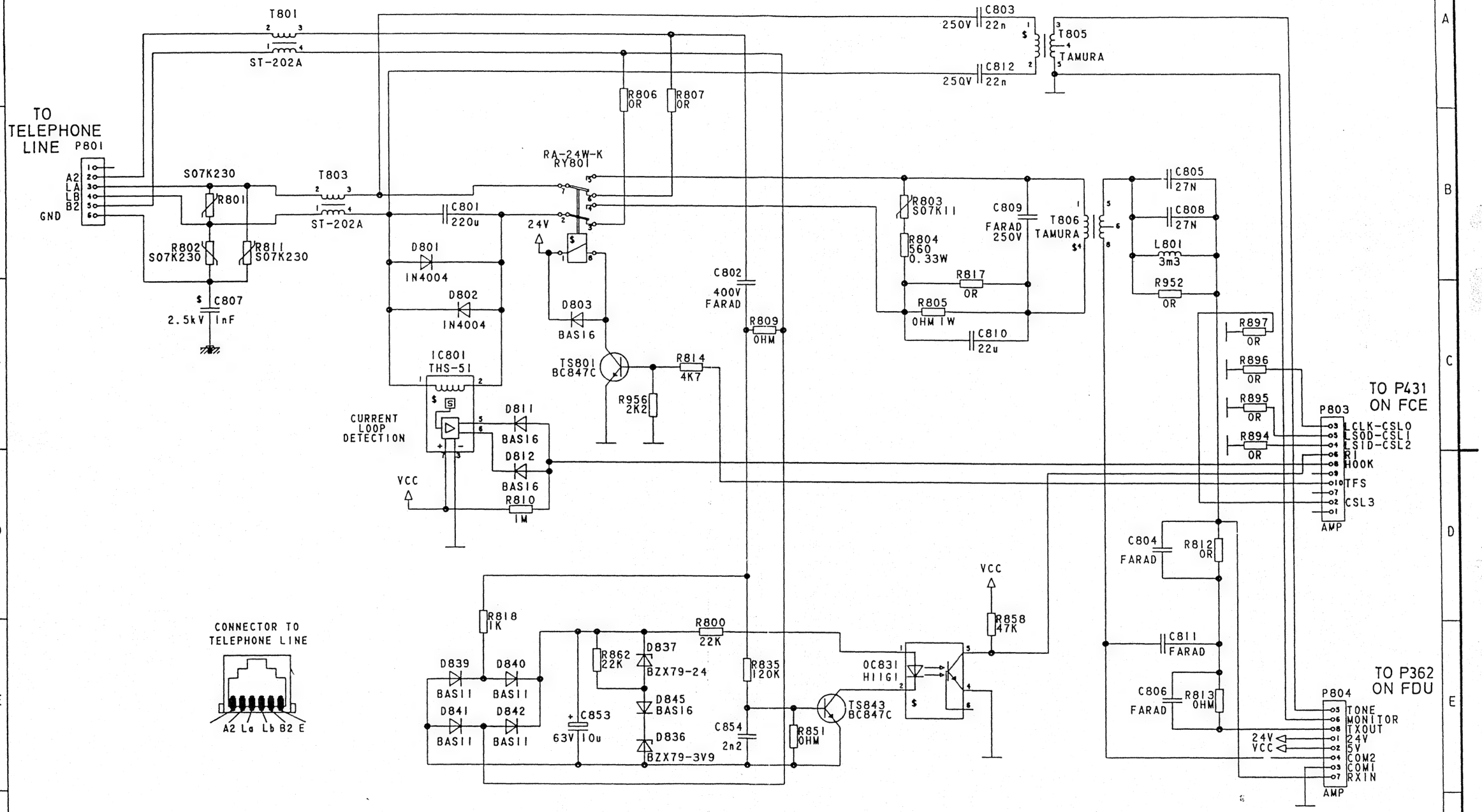
9-11

SOLDER SIDE



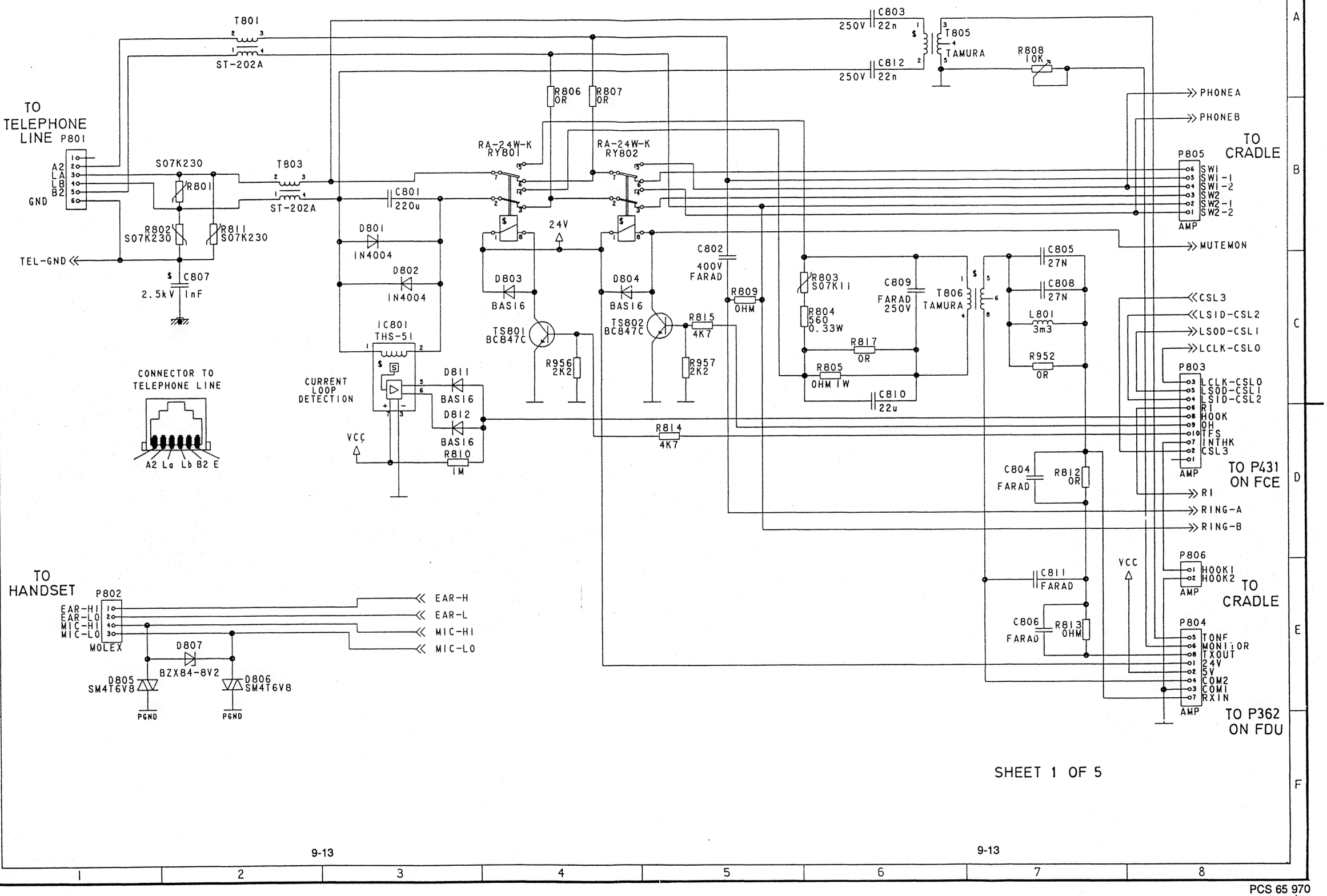
9-11

9-7. ELECTRICAL DIAGRAM LIU0 (PFC15)



SHEET 1 OF 1

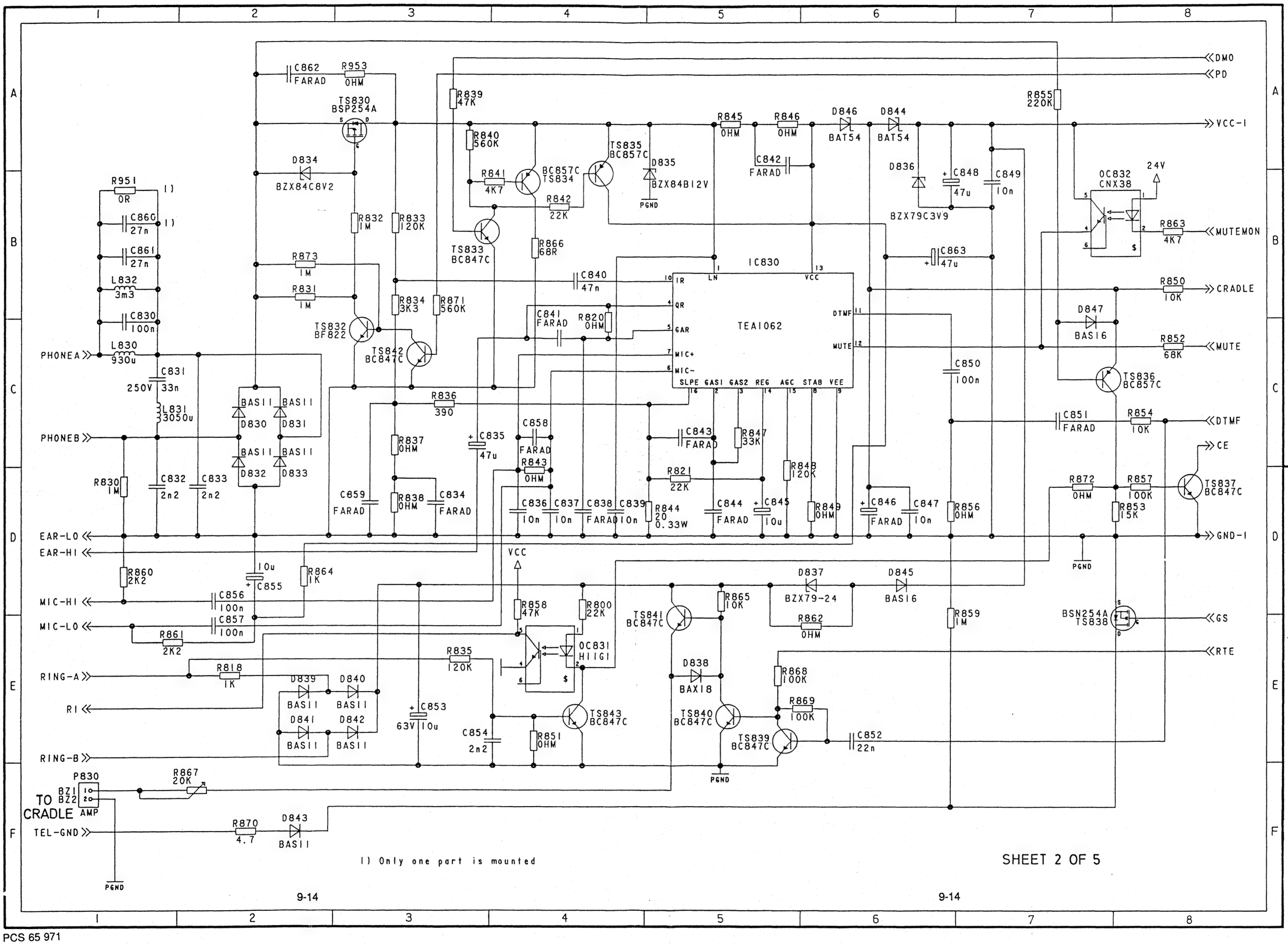
9-8. ELECTRICAL DIAGRAM LIU1,2 (PFC25,PFC35,PFC45)



SHEET 1 OF 5

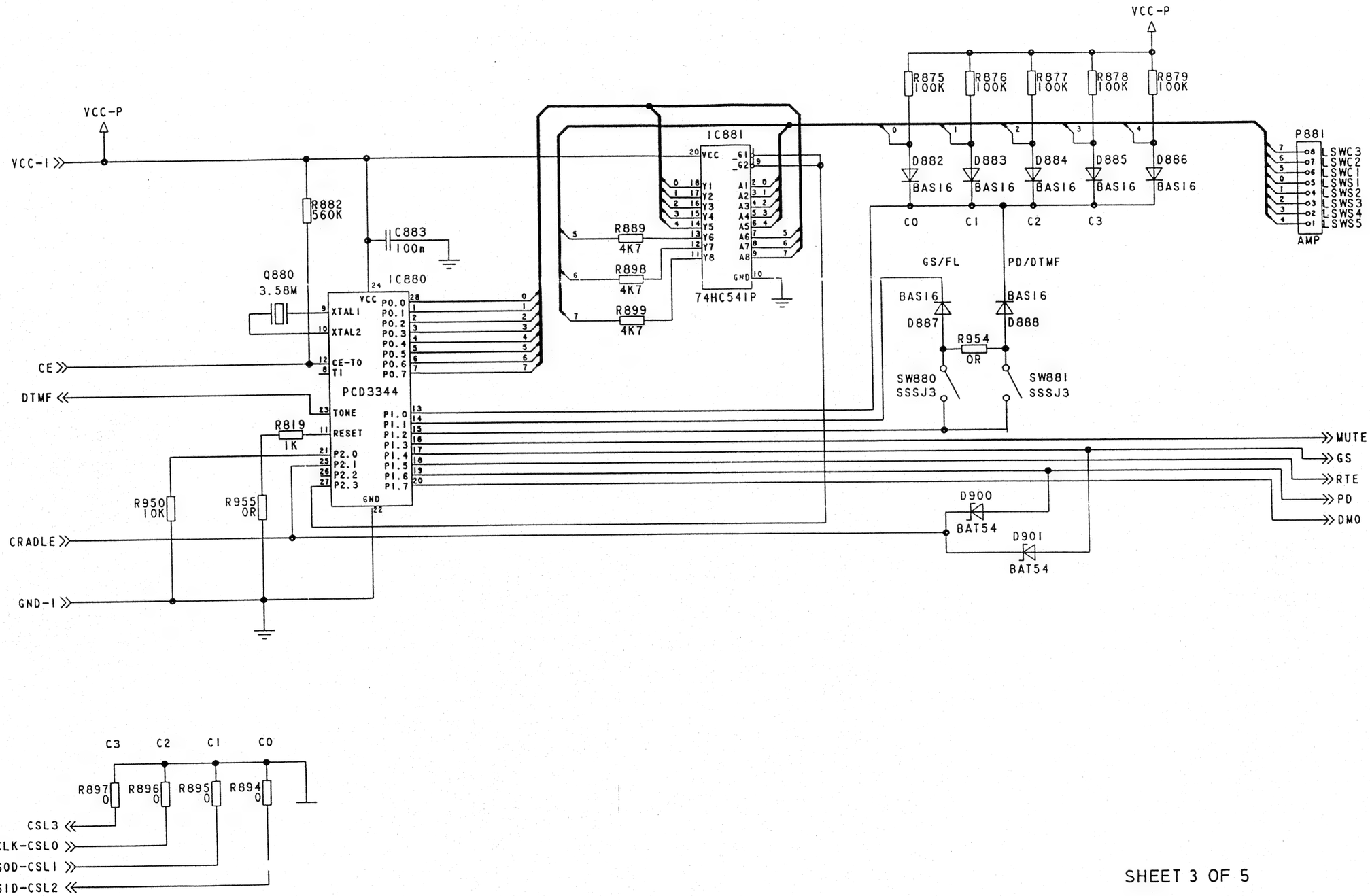
9-13

PCS 65 970


C862 FARAD
R953 0HM
TS830 BSP254A
R839 47K
R840 560K
R841 4K7
BC857C TS834
TS835 BC857C
D835 BZX84B12V
PGND
R842 22K
TS833 BC847C
R866 68R
R845 0HM
R846 0HM
D846 BAT54
D844 BAT54
R855 220K
VCC-1
C842 FARAD
D836
C848 47u
C849 10n
BZX79C3V9
OC832 CNX38
24V
R863 4K7
MUTEMON
C863 47u
D834 BZX84C8V2
R951 0R
C860 27n
C861 27n
L832 3m3
C830 100n
L830 930u
PHONEA
C831 250V 33n
L831 3050u
PHONEB
R832 1M
R833 120K
R873 1M
R831 1M
TS832 BF822
TS842 BC847C
R834 3K3
R871 560K
C840 47n
C841 FARAD
R820 0HM
IC830
TEA1062
IR
QR
GAR
MIC+
MIC-
LN
VCC
DTMF
MUTE
SLPE GAS1 GAS2 REG AGC STAB VEE
R850 10K
CRADLE
D847 BAS16
R852 68K
MUTE
TS836 BC857C
C850 100n
C851 FARAD
R854 10K
DTMF
CE
R836 390
R837 0HM
C835 47u
C858 FARAD
R843 0HM
C843 FARAD
R847 33K
R821 22K
R848 120K
R872 0HM
R857 100K
TS837 BC847C
R853 15K
BASI1 D830
BASI1 D831
BASI1 D832
BASI1 D833
R830 1M
C832 2n2
C833 2n2
C659 FARAD
R838 0HM
C834 FARAD
C836 10n
C837 10n
C838 FARAD
C839 10n
R844 20 0.33W
C844 FARAD
C845 10u
R849 0HM
C846 FARAD
C847 10n
R856 0HM
EAR-LO
EAR-HI
GND-1
VCC
R860 2K2
C855 10u
R864 1K
MIC-HI
C856 100n
MIC-LO
C857 100n
R861 2K2
R858 47K
R800 22K
OC831 H11G1
R835 120K
TS841 BC847C
R865 10K
D837 BZX79-24
D845 BAS16
R862 0HM
R859 1M
BSN254A TS838
GS
RTE
D838 BAX18
R868 100K
R869 100K
TS840 BC847C
TS839 BC847C
C852 22n
RING-A
RI
RING-B
R818 1K
D839 BASI1
D840 BASI1
D841 BASI1
D842 BASI1
C853 63V 10u
C854 2n2
R851 0HM
TS843 BC847C
P830
BZ1
BZ2
TO CRADLE AMP
R867 20K
R870 4.7
D843 BASI1
TEL-GND
1) Only one part is mounted
SHEET 2 OF 5
9-14
9-14

PCS 65 971

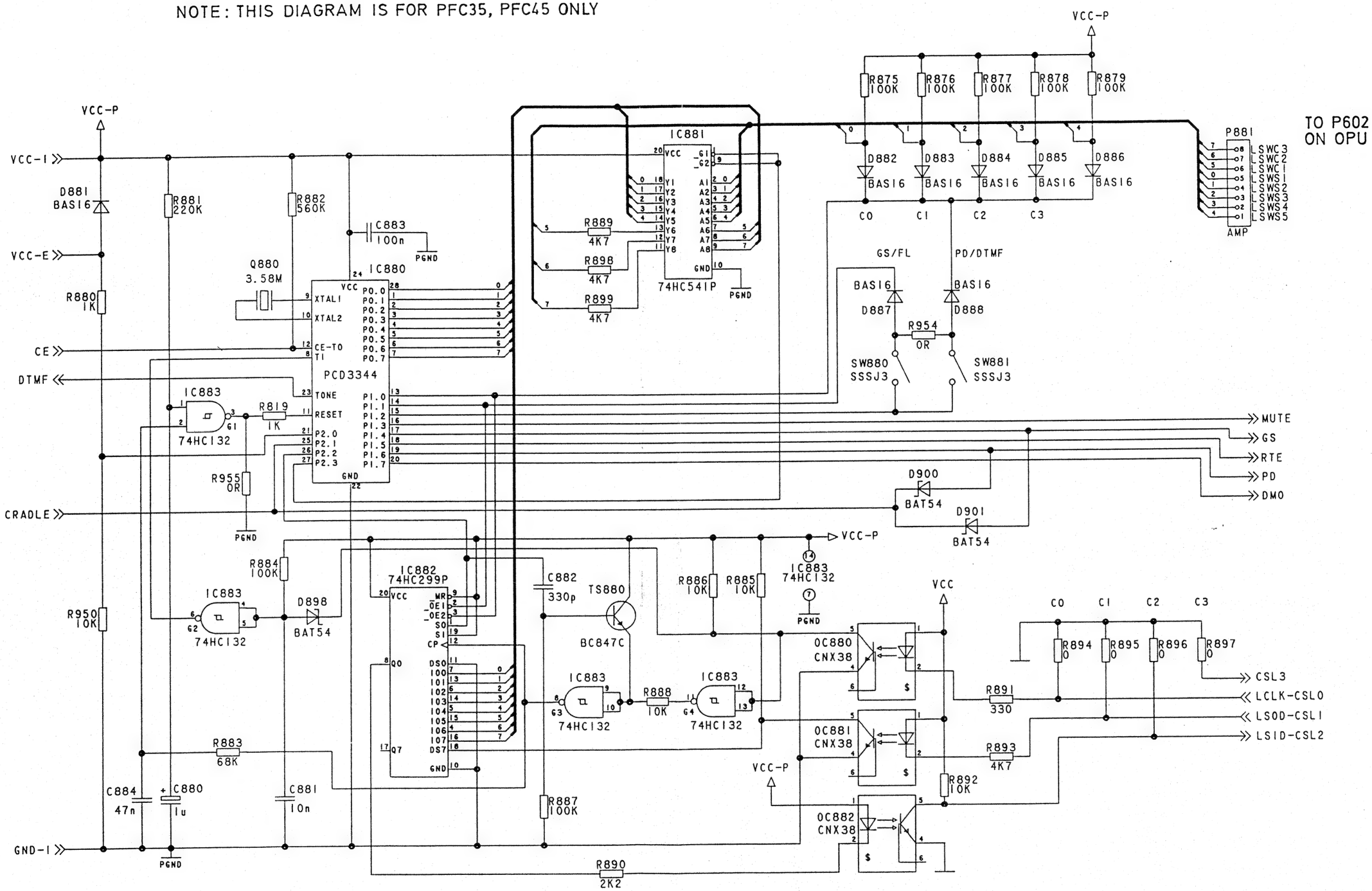
NOTE : THIS DIAGRAM IS FOR PFC25 ONLY



SHEET 3 OF 5

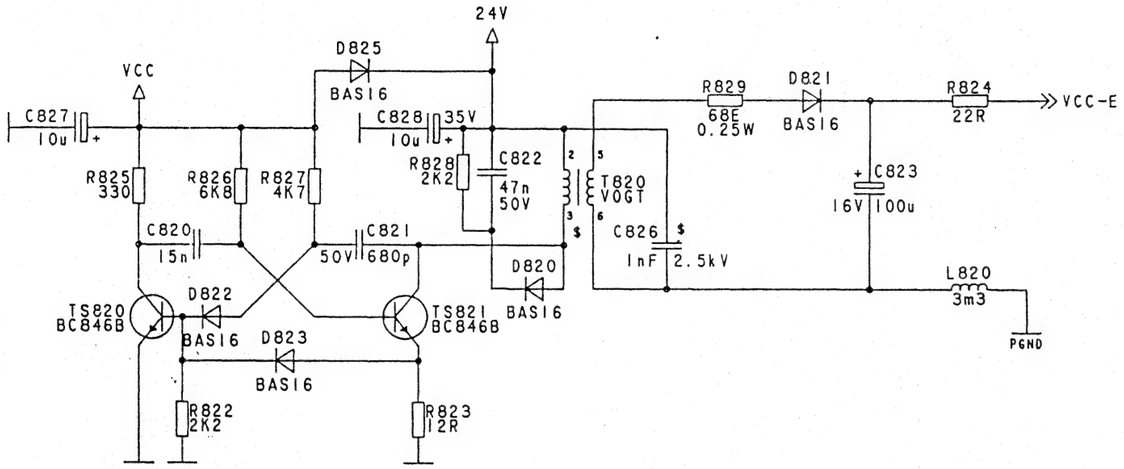
PCS 65 972

NOTE: THIS DIAGRAM IS FOR PFC35, PFC45 ONLY



SHEET 4 OF 5

9-16

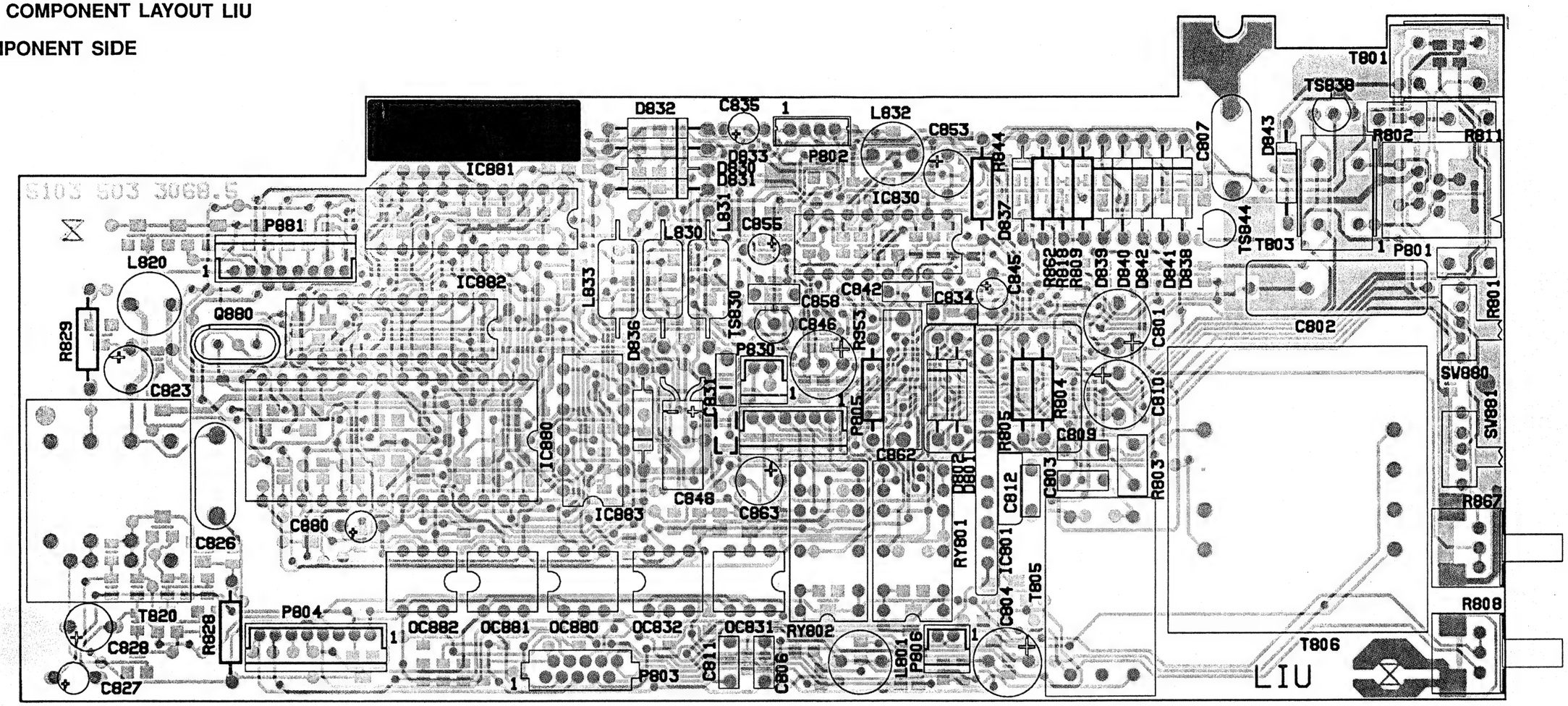


SHEET 5 OF 5

9-17

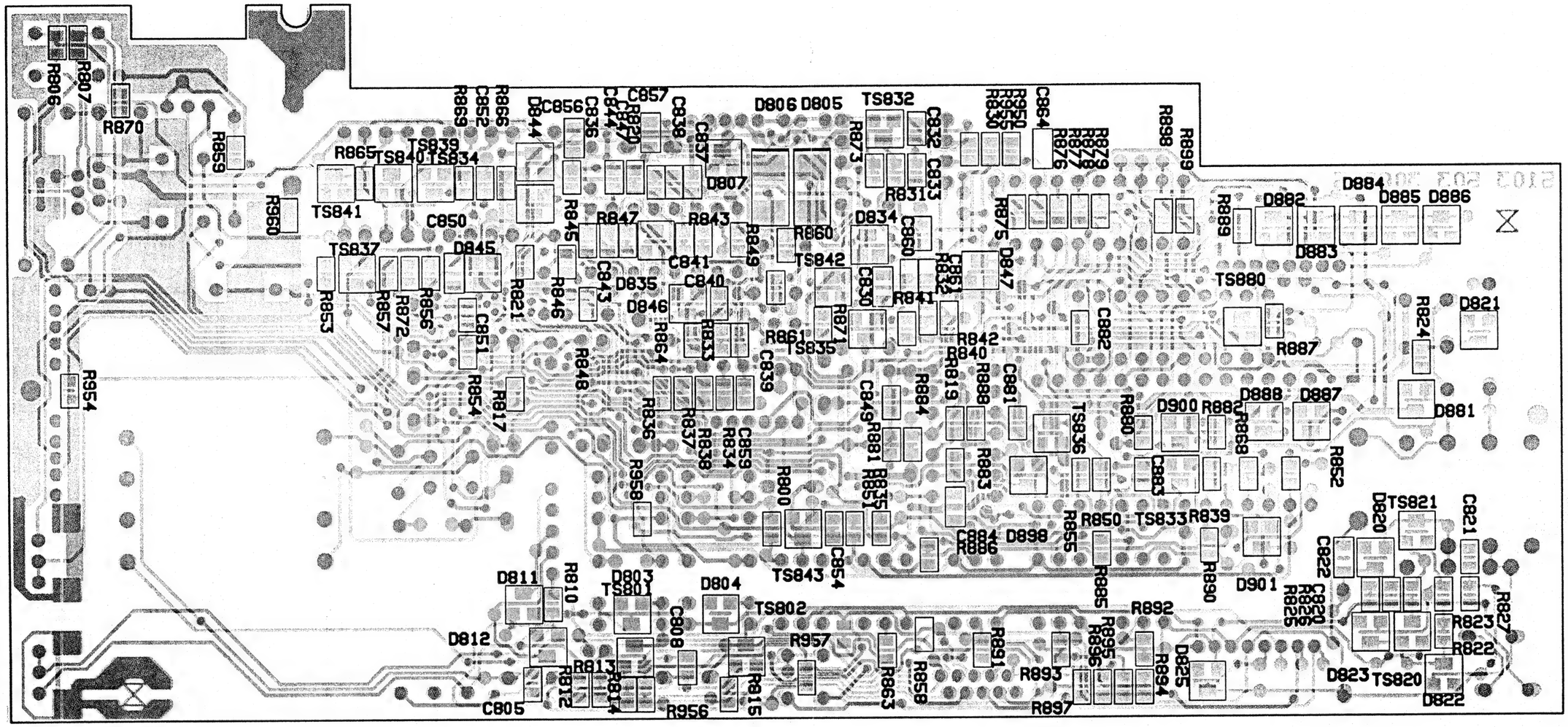
9-9. COMPONENT LAYOUT LIU

COMPONENT SIDE



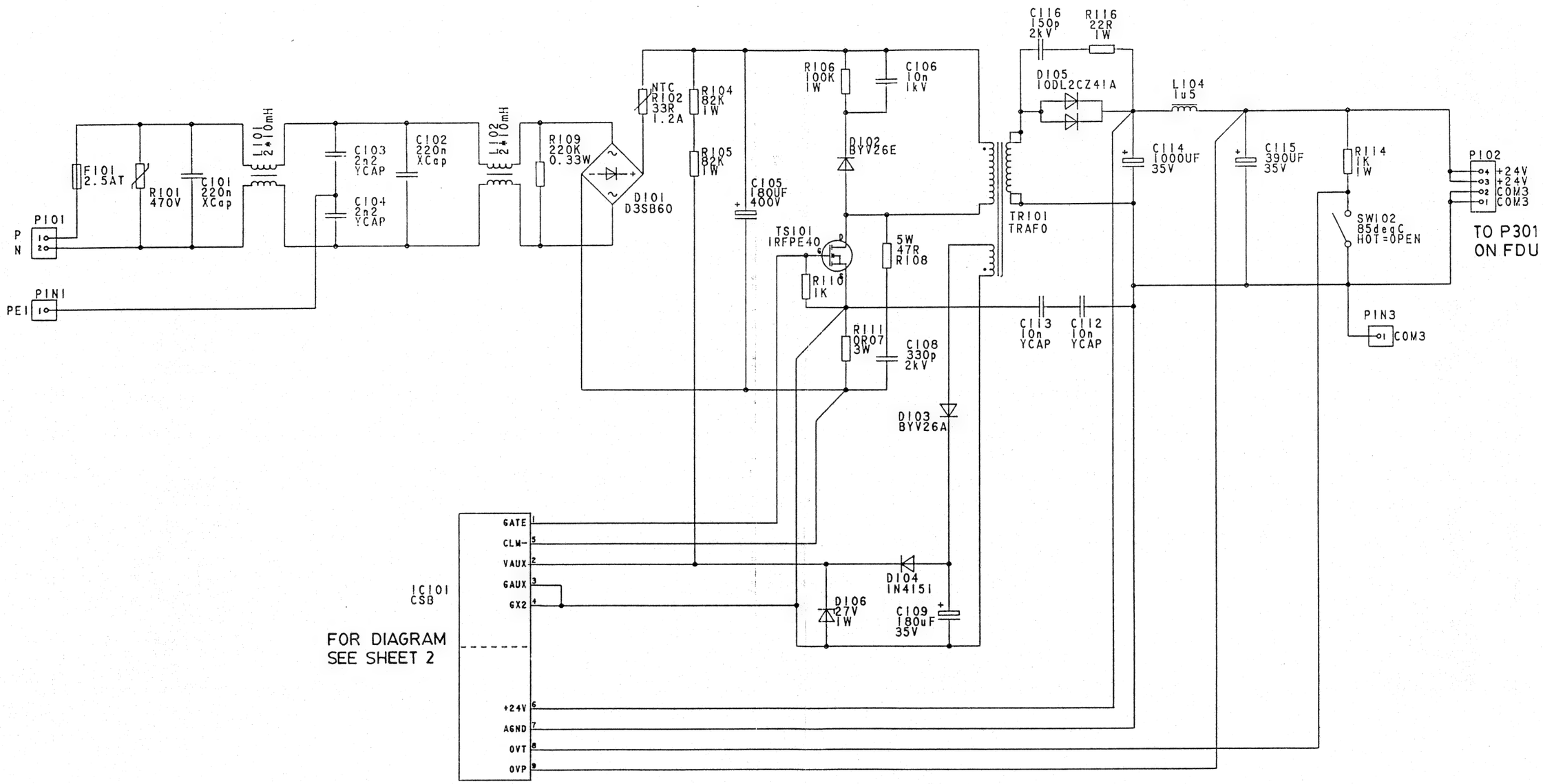
9-18

SOLDER SIDE

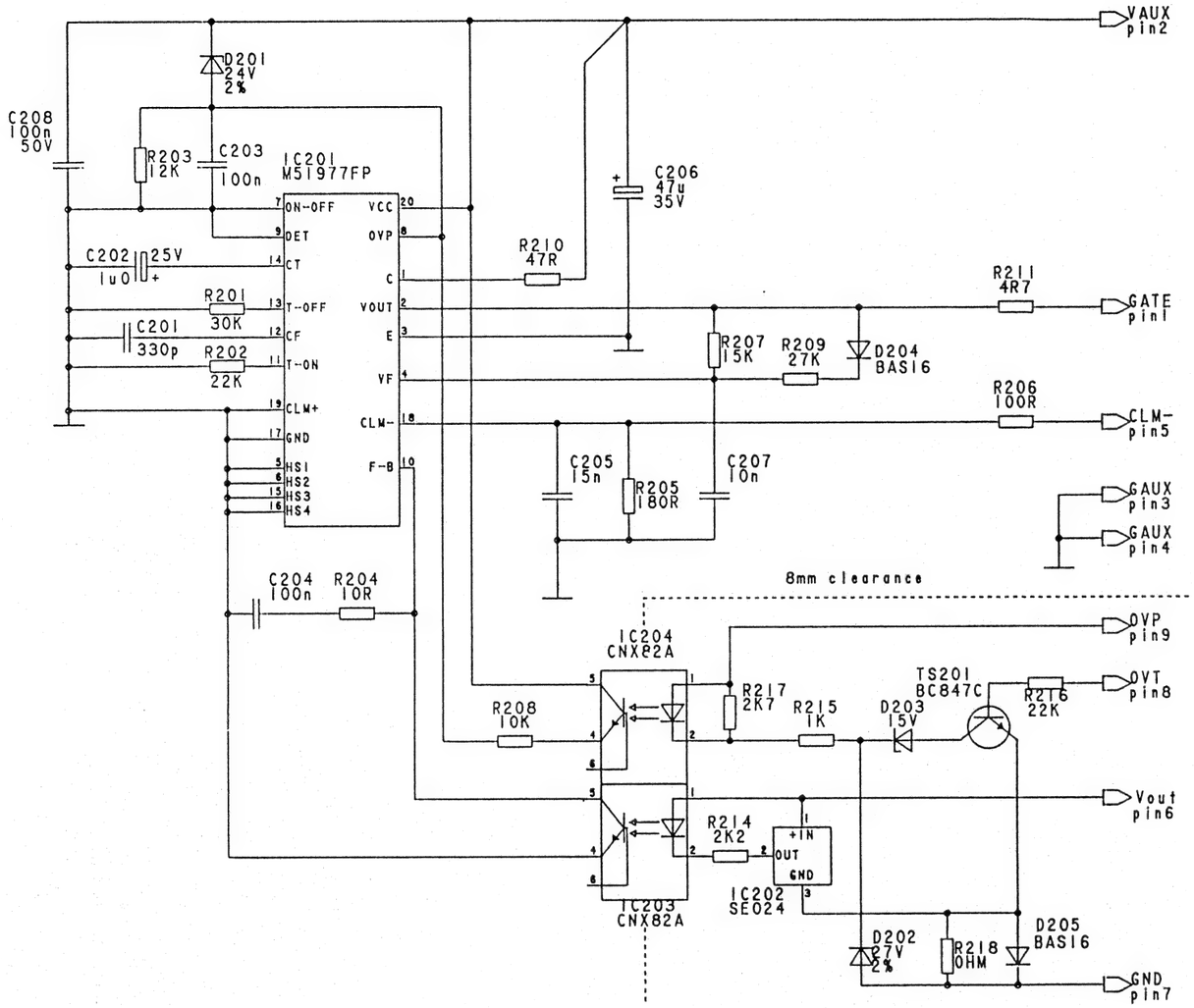


9-19

9-10. ELECTRICAL DIAGRAM POWER SUPPLY



SHEET 1 OF 2

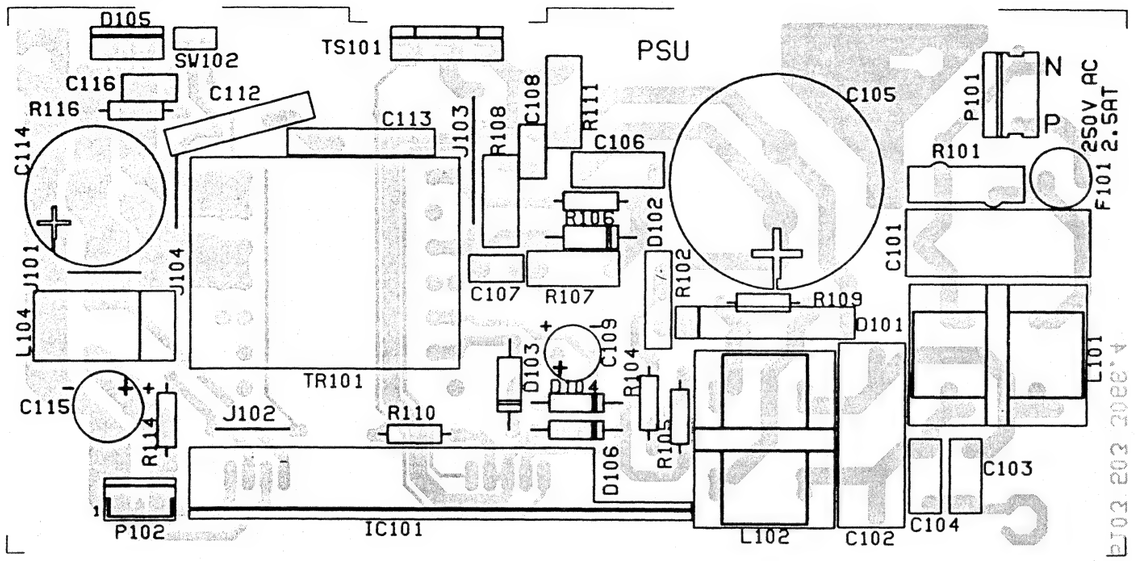


SHEET 2 OF 2

9-21

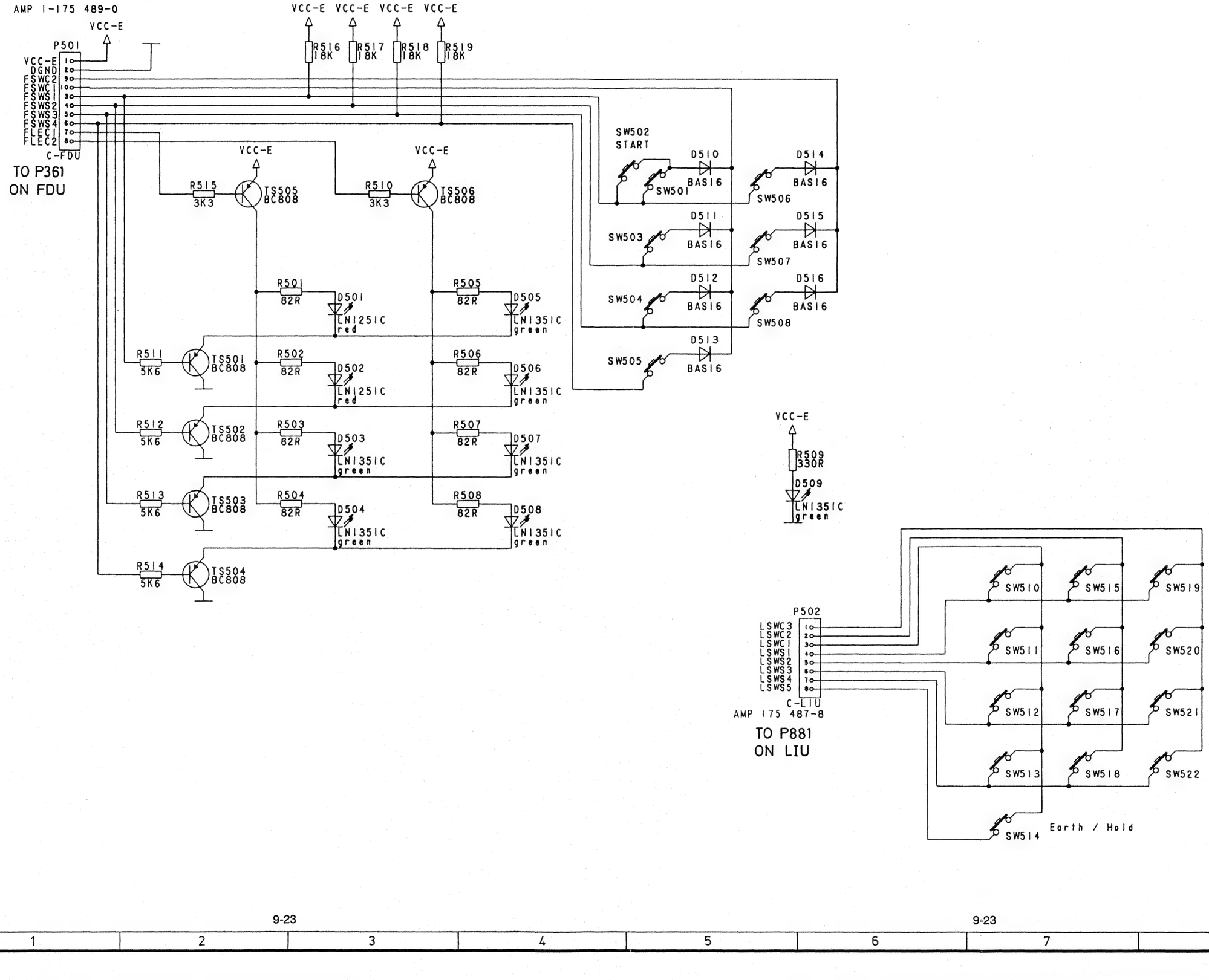
9-11. COMPONENT LAYOUT POWER SUPPLY

COMPONENT SIDE



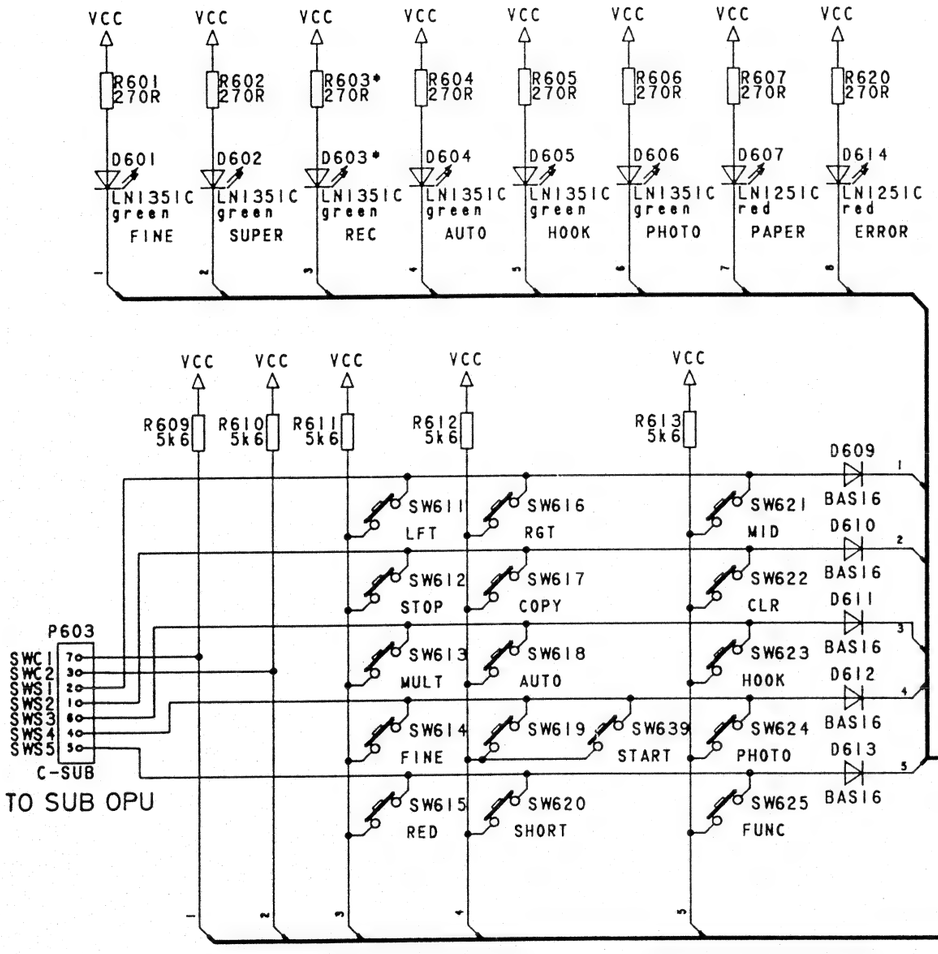
9-22

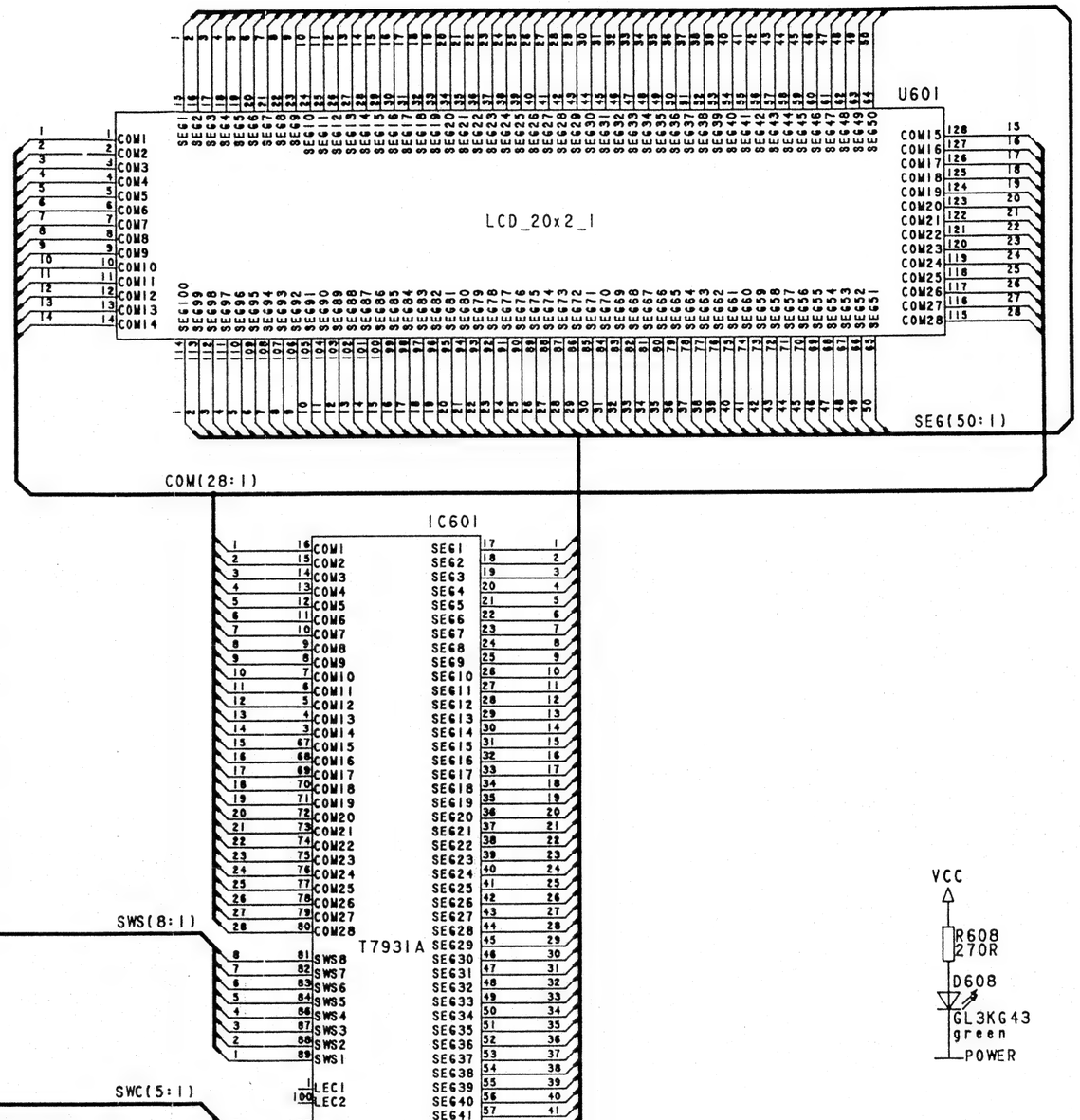
9-12. ELECTRICAL DIAGRAM OPU (PFC15,PFC25)

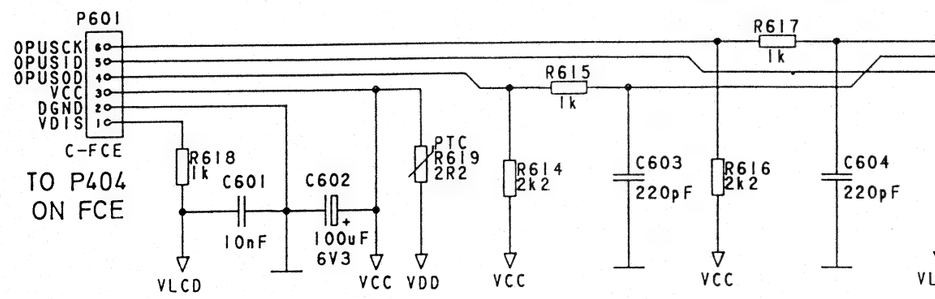


PCS 65 979

9-13. ELECTRICAL DIAGRAM OPU (PFC35,PFC45)



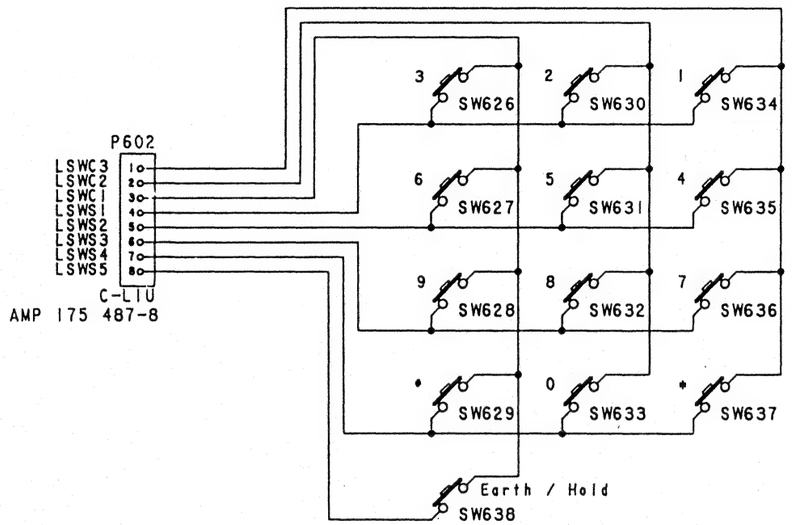




* - not assemled

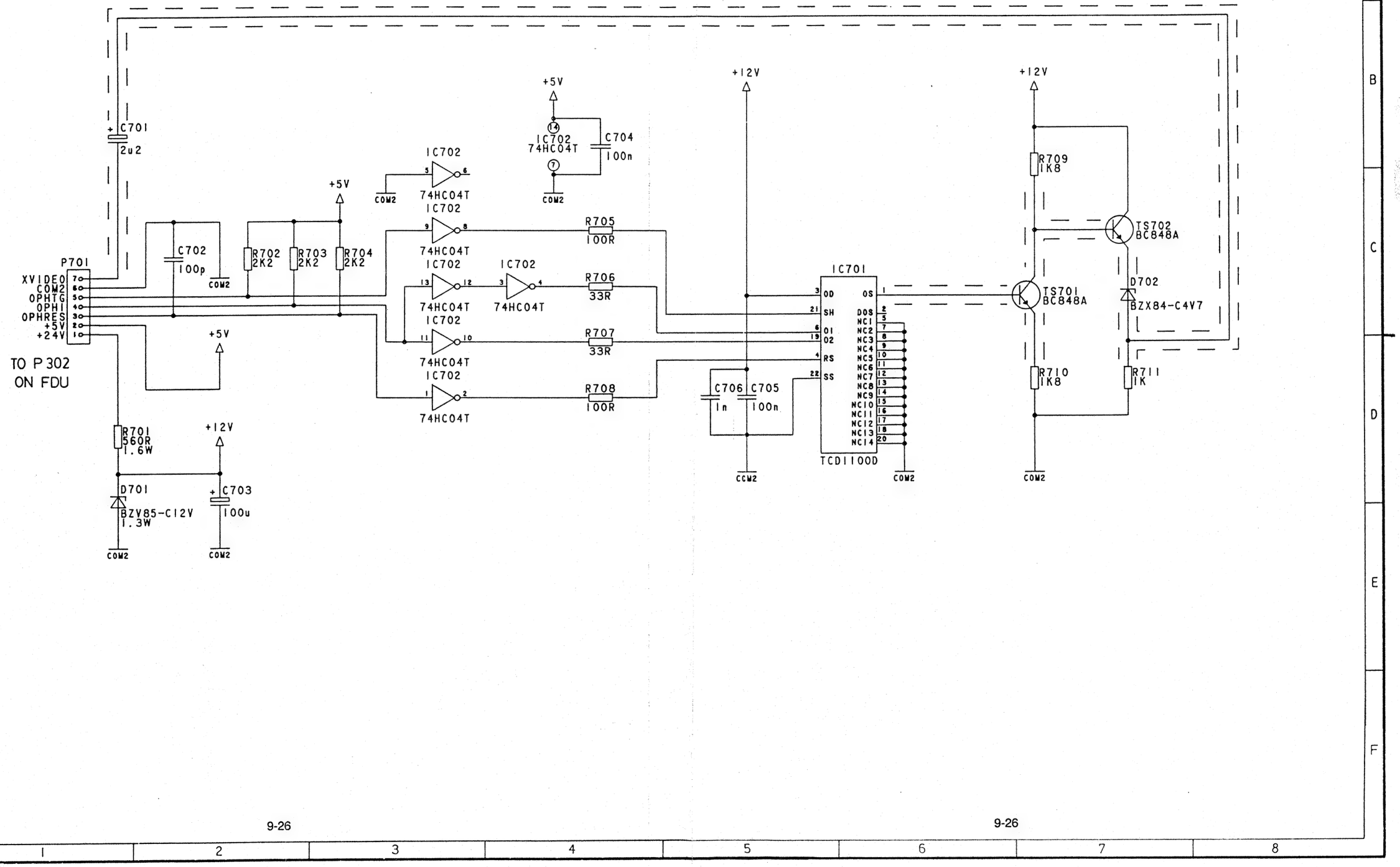
SHEET 1 OF 2

9-24


P602
LSWC3
LSWC2
LSWC1
LSWS1
LSWS2
LSWS3
LSWS4
LSWS5
1
2
3
4
5
6
7
8
C-LTU
AMP 175 487-8
3
SW626
2
SW630
1
SW634
6
SW627
5
SW631
4
SW635
9
SW628
8
SW632
7
SW636
*
SW629
0
SW633
*
SW637
Earth / Hold
SW638

9-25

9-13. ELECTRICAL DIAGRAM SBU

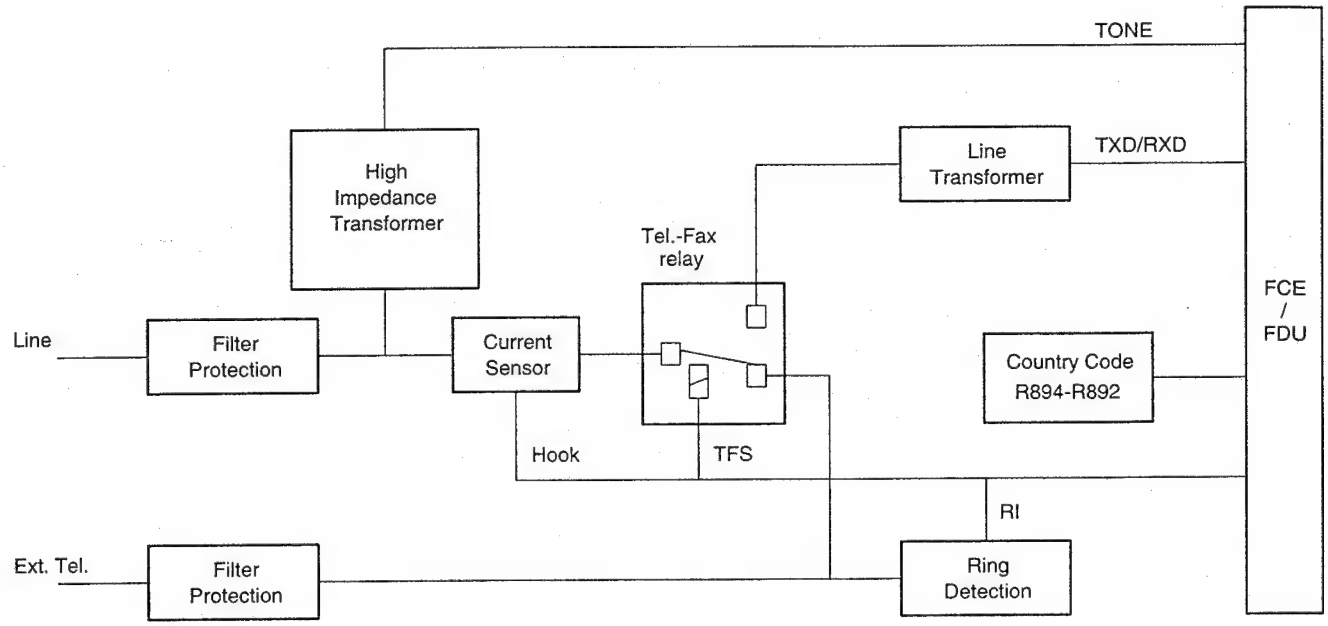


9-26

APPENDIX A: LINE INTERFACE (PFC15)

1. Overall LIU description (PFC15).

LIU Block Diagram (PFC15)



The LIU (Line Interface Unit) has all the telephone line interface. It contains filters, a current sensor, TEL/FAX (TF) relay and the Country code selection.

The TF relay switches the line connection either to the external telephone and the ringing detection circuit or to the modem. In standby mode the TF relay is switched down to connect the line to the external telephone and the ringing detection circuit.

The high impedance transformer detects the CNG tone or the silence period when the fax is in TAM mode.

2. Making a telephone Call

2-1. Manual dialling from External Telephone.

Since the PFC15 has no dial facility, an external telephone is needed to establish calls.

In standby mode, the line is connected to the external telephone. Then the user can dial from the external handset. If the user presses Start to send or receive a fax message, the TF relay switches up to connect the line to the modem.

3. Receiving a Telephone Call.

3-1. Manual Receive mode

The user picks up the handset to listen to the line. If message is a fax message the user press Start to receive a fax message. The TF relay switches up to connect the line to the modem.

3-2. Auto Receive (Fax mode)

When the machine detects a ringing signal, the machine switches up the TF relay and starts to send CED/DIS/NSF for fax reception.

3-3. Auto Receive (TAM mode)

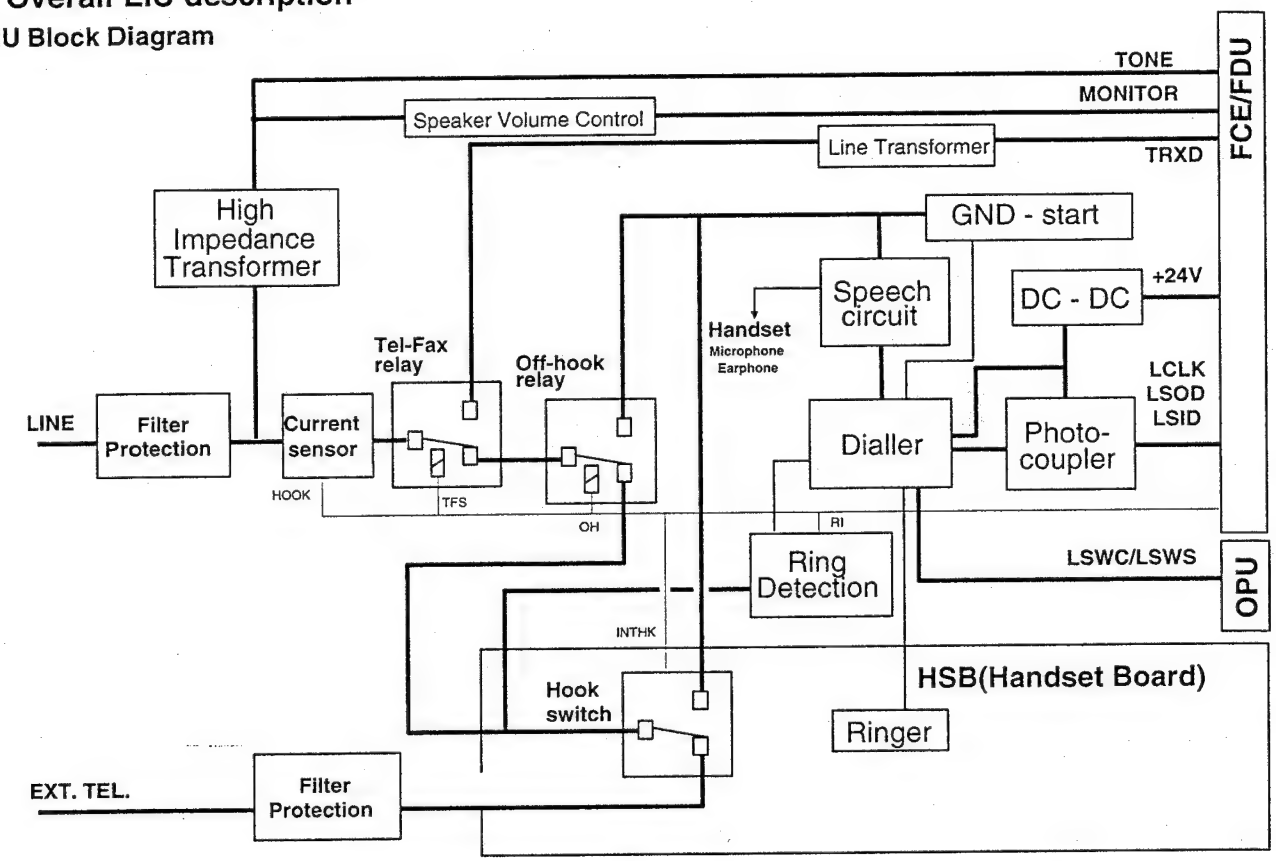
This mode is only for use when a telephone answering machine (TAM) is connected to the same line.

When a call is coming in, the external TAM first catches the call; the machine can detect this by checking the HOOK signal. To let the TAM catch the line first, the TAM answer delay time programmed in the machine must be longer than the answer time of the external TAM. After catching a call the TAM sends the pre-recorded message to the other end, and the machine starts to detect a CNG or a silence period (variable). If the machine detects a CNG or a silent period, the machine regards the other end as fax terminal and sends CED/DIS/NSF to receive the fax message.

APPENDIX B: LINE INTERFACE (PFC25/PFC35/PFC45)

1. Overall LIU description

LIU Block Diagram



The LIU (Line Interface Unit) has all the telephone line interface functions and contains a telephone unit which is powered by the machine when the machine is switched on, and is alternatively powered from the telephone line when the machine is switched off.

The line interface contains filters, a current sensor, TEL/FAX (TF) relay, Off-Hook (OH) relay and ring detection circuit. The TF relay switches the line connection either to the internal telephone unit or to the modem. The OH relay switches the line either to the built-in handset, external telephone and the ring detection circuit or to the internal telephone circuit. In standby mode, both relays are switched down to connect the line to the external telephone and the ring detection circuit. The Hook Switch connects the line to the external telephone when the built-in handset is on-hook, and connects the line to the internal telephone unit when the handset is off-hook.

The internal telephone unit contains the handset interface, speech circuit, and a dialler (a single chip PCD3344 microcontroller with built-in CPU, ROM, RAM and DTMF tone generator). With this microcontroller, the LIU does not have Dial (DI) and Dial Suppress (DS) relays.

The single tone signals, CNG, CED, dial tone, and busy tone are detected by the on the FCE through a high impedance transformer.

2. Making a Telephone Call

2-1. Manual Dialling from the External Telephone

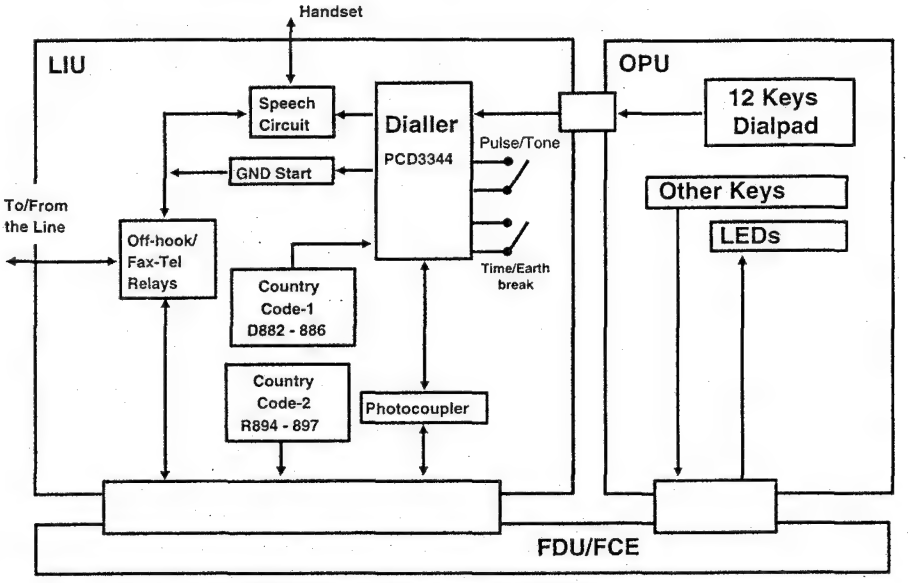
In standby mode, the line is connected to the external telephone. Then the user can dial from the external handset. If the user presses Start to send or receive a fax message, the TF relay switches up to connect the line to the modem.

2-2. Manual Dialling from the Built-in Telephone

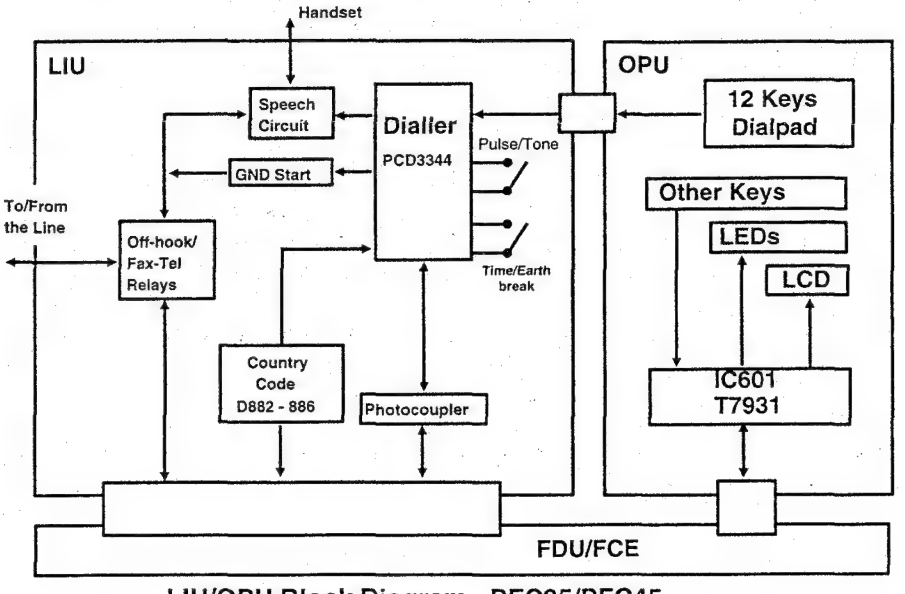
There are two ways to dial manually from the built-in telephone: handset mode and on-hook mode.

Handset mode: When the user picks up the handset, the Hook Switch goes up to connect the line to the dialler and speech circuit. The digits dialled at the dialpad are directly informed to the dialler, and the dialler dials the number and passes them to the FCE to indicate the dialled number on the LCD (PFC35/PFC45). If the user presses Start to send or receive a fax message, the TF relay switches up to connect the line to the on the FCE.

On-hook mode: When the user presses the On Hook Dial key, the OH relay switches up to connect the dialler to the line. Then the dialler acts in the same way as explained for handset mode.

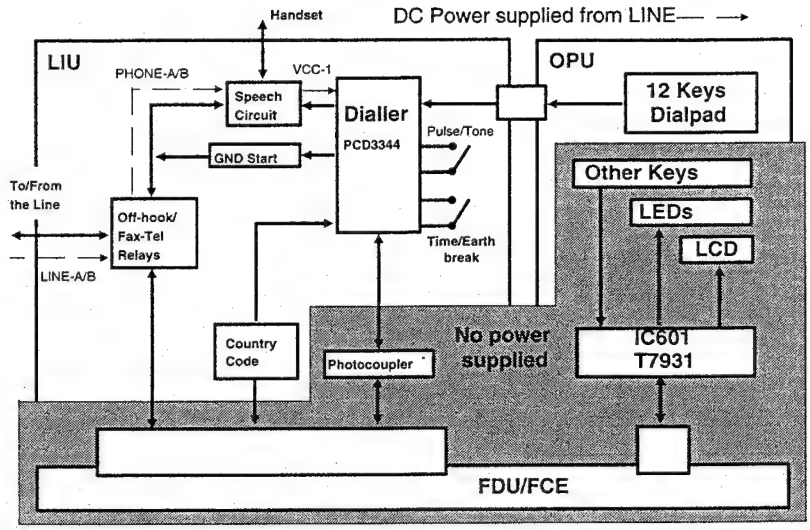


LIU/OPU Block Diagram - PFC25



LIU/OPU Block Diagram - PFC35/PFC45

The telephone features (dialling, voice communication) can also be used when the machine is switched off.
When the handset goes off-hook or the On Hook Dial key is pressed, the dialler is powered by the DC voltage from the line. Then the dialled digits are directly informed to the dialler



LIU/OPU Block Diagram - Power OFF

2-3. Automatic Dialling

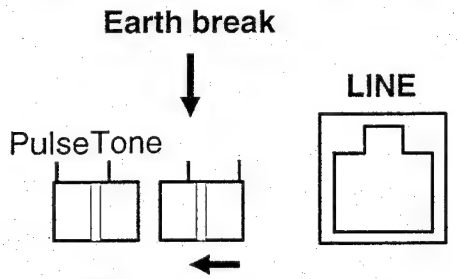
When the machine starts to dial, the TF relay switches up to close the DC loop. After the HOOK signal goes low to indicate that line current is detected, and the modem detects dial tone at TONE (see the diagram on page B-1), the dialler starts dialling. Then the machine waits for the line connection and CED before it starts sending the fax message. If busy tone is detected before line connection, the machine will disconnect the line.

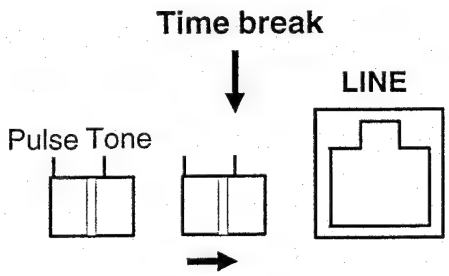
2-4. Dialling Method (Pulse/Tone)

The LIU has a mechanical switch beside the modular jack to select either pulse dial or DTMF dial. This switch can be accessed by the user (in most countries). The dialler checks the setting of this switch every time the FCE detects off-hook, then dials the number using the indicated method.

2-5. PSTN Access from behind the PABX

When the machine is behind a PABX, the user can program which type of access method is required.
Loop Start: The user has to program an access code with Function 15.
Time/Earth break: The user has to select Time/Earth break with Function 15, and select the function of the Transfer key either for Earth break or Time break with the mechanical switch on the LIU.
After the DC loop is closed, the machine detects the line current, detects PABX dial tone, accesses the PSTN using the correct method, detects PSTN dial tone, then dials the number.



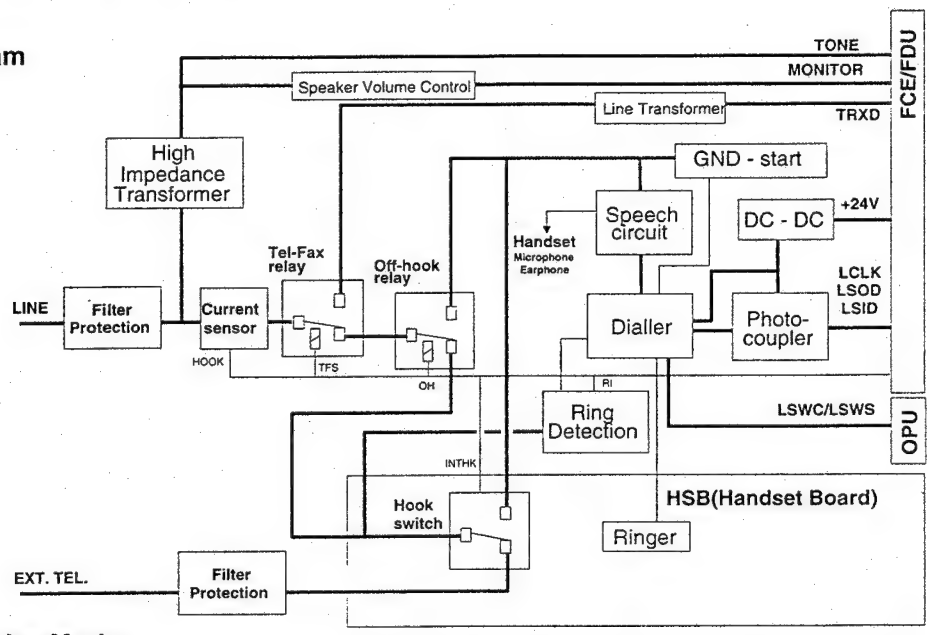


2-6. Country Settings

Each country setting is programmed in the ROM on the FCE. The FCE passes the dialling parameters to the dialler on the LIU through photocouplers, depending on the country code setting on the LIU.

3. Receiving a Telephone Call

LIU Block Diagram



3-1. Manual Receive Mode

When the user picks up the handset, the Hook Switch goes up to connect the line to the speech circuit for voice conversation. If the user presses Start to send or receive a fax message, the TF relay switches up to connect the line to the modem, which is on the FCE.

3-2. Fax Mode

When the machine detects a ringing signal, the machine switches up the TF relay and starts to send CED/DIS/NSF for fax reception.

3-3. Auto Mode

This mode switches the line automatically to the internal telephone unit or to the modem, depending on the type of remote terminal (phone or fax).
When the machine detects a ringing signal, the machine switches up the TF relay (the ringer is disabled by the dialler in this mode). Then the machine starts CNG detection, starts to send a voice message (3.5 s after ring detection), and starts to call the user to the machine (10 s after ring detection). If a CNG is detected during these periods, the machine starts to send CED/DIS/NSF for fax reception. If the user picks up the handset (the Hook Switch goes up), the machine switches down the TF relay to connect the line to the speech circuit. If CNG is not detected and the user does not respond to the call within 30 s, the machine sends CED/DIS/NSF before disconnecting the line.

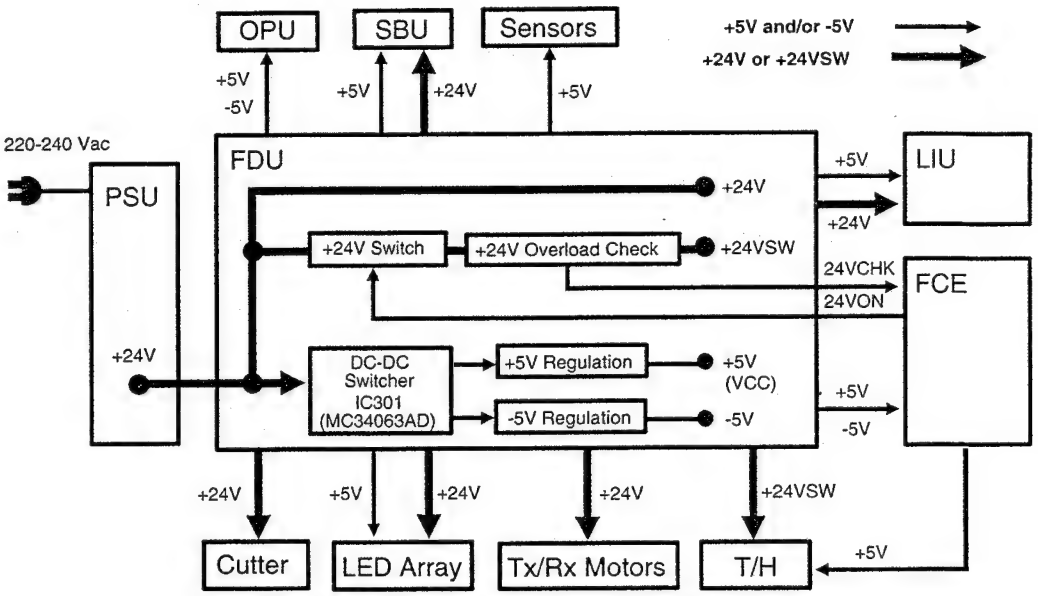
3-4. TAM Select Mode

This mode is only for use when a telephone answering device (TAD) is connected to the same line.
When a call is coming in, the external TAD first catches the call; the machine can detect this by checking the HOOK signal. To let the TAD catch the line first, the TAD answer delay time programmed in the machine has to be longer than the answer time of the external TAD. After catching the call, the TAD sends the pre-recorded message to the other end, and the machine starts to detect a CNG and a 5s (variable) silent period. If the machine detects a CNG or a 5s silent period, the machine regards the other end as a fax terminal and sends CED/DIS/NSF to receive the fax message.

APPENDIX-C: POWER DISTRIBUTION

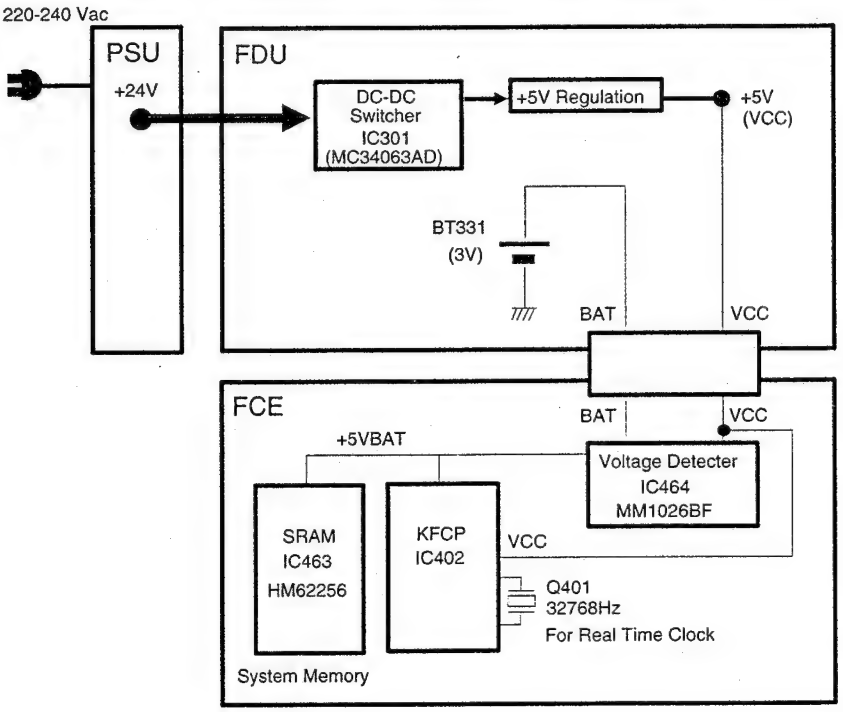
1. PSU/FDU

The PSU regulates the 220-240 Vac input to generate +24 Vdc. The +24Vdc is then supplied to the secondary power supply circuit on the FDU to generate the +/- 5 Vdc. The +24VSW for the thermal head is switched on by the FCE when a fax call is coming in; this voltage is watched by the FCE to check for overload.



2. Battery Back-up

The KFCP (on the FCE board), which has an oscillator for the real time clock and the SRAM for system memory have to be backed up always by dc voltage to keep the oscillator working and to keep the system set-up data in the RAM.
When the power is supplied from the PSU, VCC (+5V) and +5VBAT back up these ICs. When power is not supplied from the PSU, the voltage detector on the FCE connects the BAT signal, on which +3Vdc is supplied from the battery on the FDU, to +5VBAT, so that it can back-up these ICs.



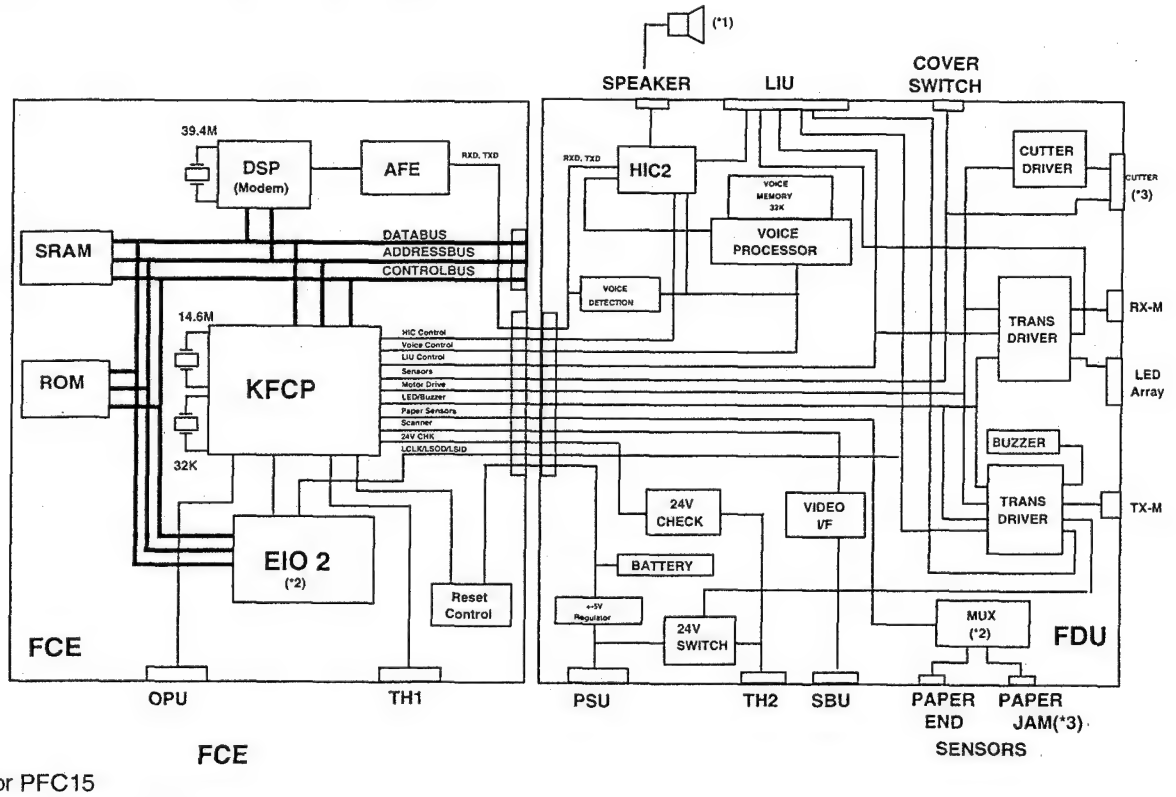
3. LIU Back-up

When the power is not supplied from the PSU, the internal telephone unit is still active. When the handset is picked up or the On Hook Dial key is pressed, the dc loop in the LIU circuit is closed. Then the speech and ring detection circuit regulates the line voltage to wake up the microcontroller on the LIU. For more details, see Appendix-B "Line Interface".

APPENDIX-D: ELECTRICAL DESCRIPTION

1. PCBs

This section explains each function of the PCBs and their components.



FCE

*1: Not for PFC15
*2: Not for PFC15 and PFC25
*3: PFC45 only

1-1. FCE (Facsimile Control Engine)

This engine board performs all control tasks, image processing, and Tx/Rx data processing. It contains KFCP (contains a CPU and a video processor), DSP (contains modem), a ROM (512 kbits for PFC15/PFC25 and 1 Mbits for PFC35/PFC45), an SRAM (8 kbytes for PFC15/PFC25 and 32 kbytes for PFC35/PFC45). An OTP (One Time Programmable) ROM is included in the PLCC

1-2. FDU (Facsimile Driver Unit)

This driver unit interfaces with the peripherals. It contains Tx, Rx and cutter motor drivers, scanner interface, secondary power supply (which generates ±5V from the +24V output from the PSU), a battery for FCE back-up, a HIC for modem signal amplification and filtering, and an AVM generation circuit.

1-3. LIU (Line Interface Unit)

This unit performs all interface functions to the telephone line and contains an internal telephone unit. Refer to the Appendix A and Appendix B: Line Interface for details.

1-4. PSU (Power Supply Unit)

This unit regulates the 220-240V ac input and generates +24V for the FDU and thermal head. The power cord and the main switch are separate from the PSU assembly and are fixed to the body frame.

1-5. SBU (Sensor Board Unit)

This unit has a CCD which scans the document and detects light path blockage by the document/scan line sensor actuators.

1-6. OPU (Operation Panel Unit)

This unit receives all keypad input information and indicates instructions for users using LEDs and an LCD (PFC35/PFC45). The ten key pad (not for PFC15) is still available for dialling even if the main power is switched off.

1-7. HSB (Hook Switch Board)

This board has a hook switch and a ringer.

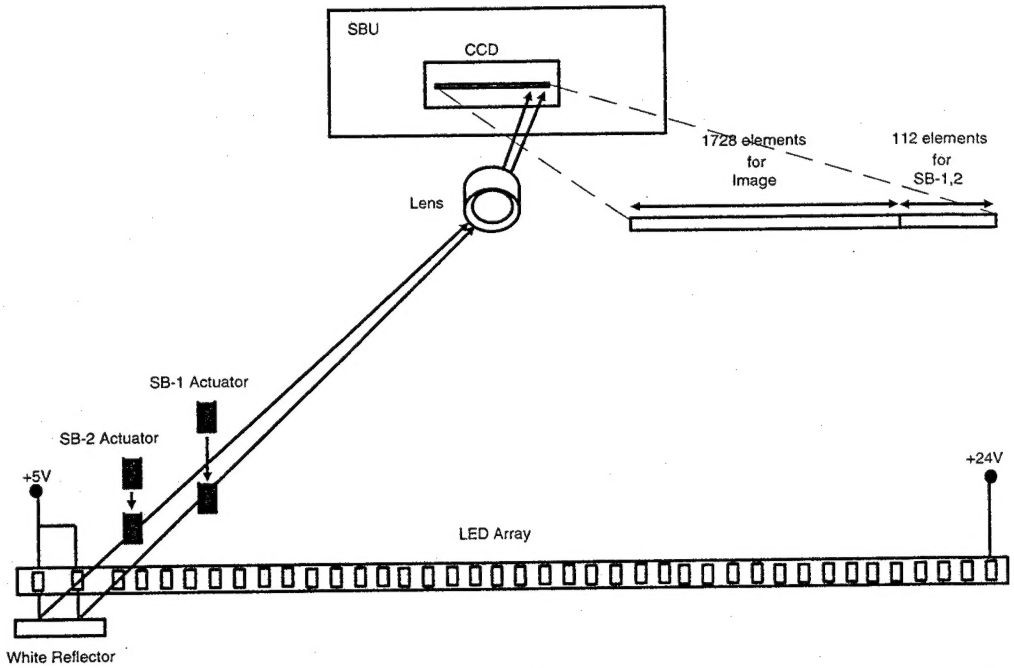
APPENDIX E. MECHANICAL DESCRIPTION

1. ADF/Scanner

The machine has two significantly different points in the ADF/scanner mechanism from the previous models. The first point is the integrated scanner and sensor mechanism, and the second point is the simplified ADF mechanism.

1-1. Integrated Scanner/Sensor Mechanism

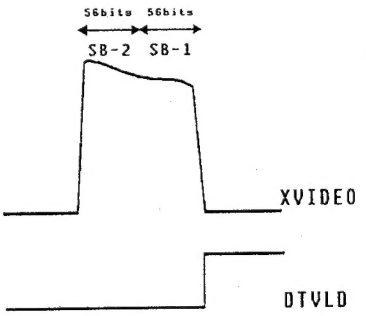
The document sensor (SB-1) and scan line sensor (SB-2) are integrated into the scanner mechanism. The basic composition of these sensors is similar to photointerrupters. However, instead of using discrete photodiode/phototransistor assemblies for each sensor, elements of the LED array and CCD are used.



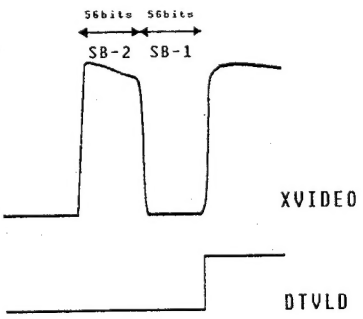
On the left hand side of the LED array, there are red LEDs dedicated for the two scanner sensors. These LEDs are always on. Light from these LEDs passes through the lens to the right hand side of the CCD, where there are 112 elements specially provided to detect this light (the 4th bit is allocated to the scan line sensor (SB-2) and the 58th bit is allocated to the document sensor (SB-1)).

If a sensor actuator blocks the light path, the CCD waveform shows a dropout, then the CPU will detect it.

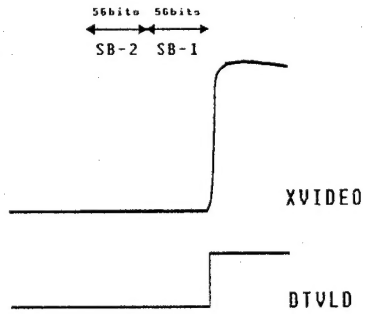
In standby mode, the CCD output is as shown on the right. The peak on the left side of the waveform indicates that the light path in both of the sensors is unblocked.



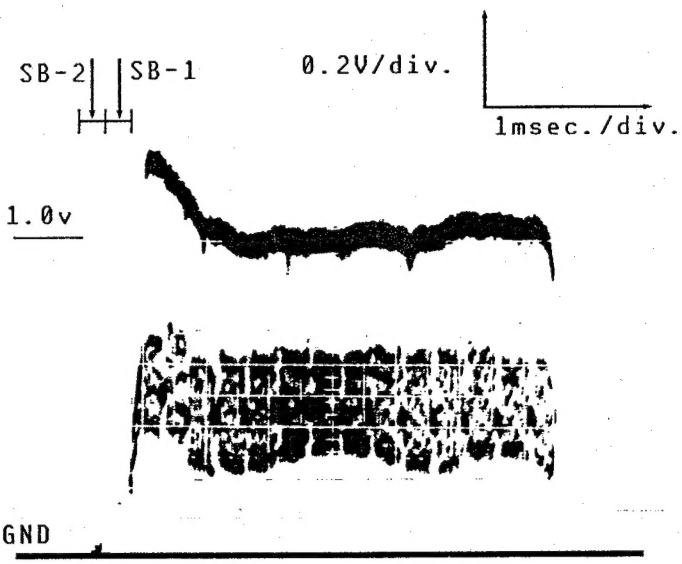
When a document is placed in the feeder, the document sensor actuator blocks the light path to the CCD. When the cpu detects this, it starts prefeeding the document and switches on the rest of the LED array.



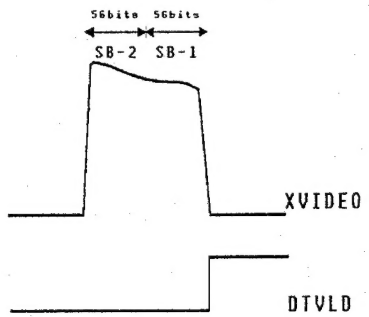
When the document reaches the scan line sensor, the actuator blocks the light path through that sensor. Then prefeed stops to prepare for scanning.



The XVIDEO output while the machine is scanning the document is shown on the right. While scanning the document, the LED flashes in every 10 m. to get superb image quality.

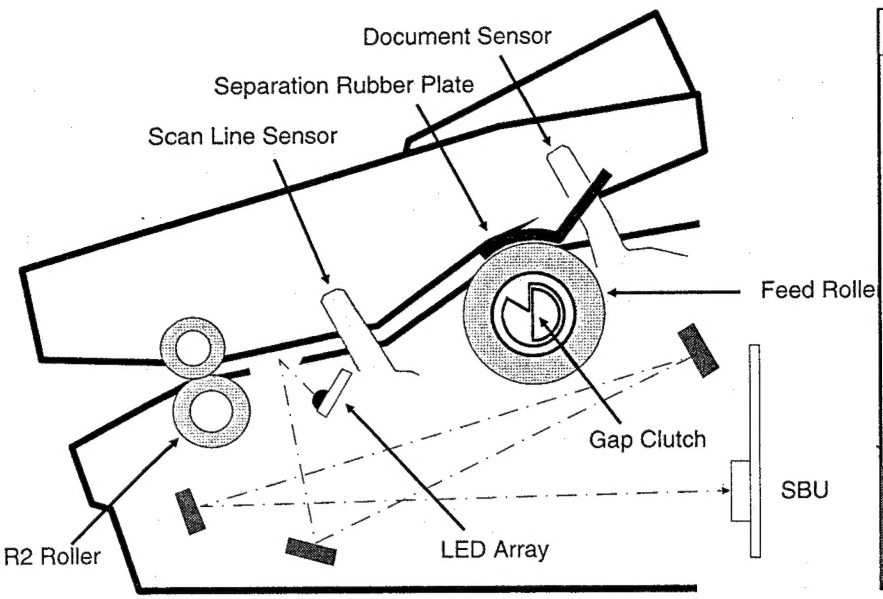


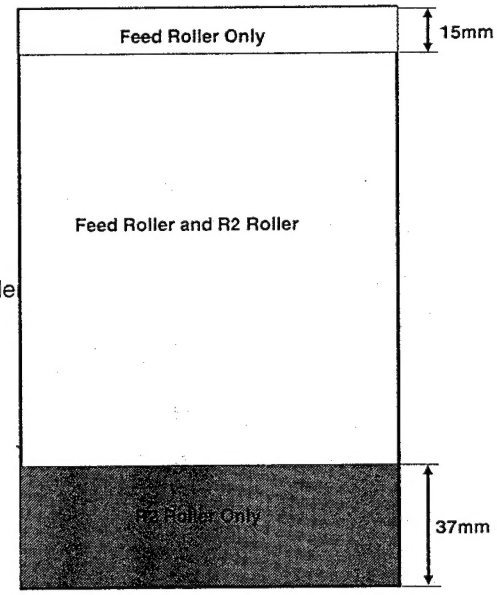
As the trailing edge of the page leaves the scan line sensor, the light path through that sensor becomes unblocked again. However, if there are some pages remaining in the feeder, the light path through the document sensor remains blocked.



After the transmission has ended, or after the copy has been printed, the LEDs for scanning the original switch off. The scanner is back in standby mode.

1-2. ADF Mechanism





The ADF consists of the feed roller, R2 roller, document/scan line sensors and separation rubber plate. When a document is placed in the feeder, the document sensor detects it as explained in the previous section. Then, the CPU switches the LED array on and turns the feed roller until the document reaches the scan line position. After the handshake is completed or the Copy key is pressed, the feed roller feeds the document until the leading edge reaches the R2 roller (the machine scans the first 15 mm of the document). From this point, the R2 roller feeds the document until the trailing edge of the document passes the feed roller. The R2 roller turns a bit faster than the feed roller. After the trailing edge passes the feed roller, the R2 roller feeds the document.
So, the document is fed into scanner slowly during the first 15 mm , at regular speed when the document is on both rollers, then at a faster speed when the document is free from the feed roller. The magnification rate of the copied image varies in these three parts as shown in the diagram.

2. Printer

The printer mechanism for PFC15/PFC25/PFC35 is different from the PFC45. The PFC45 only has a cutter and decurler unit.

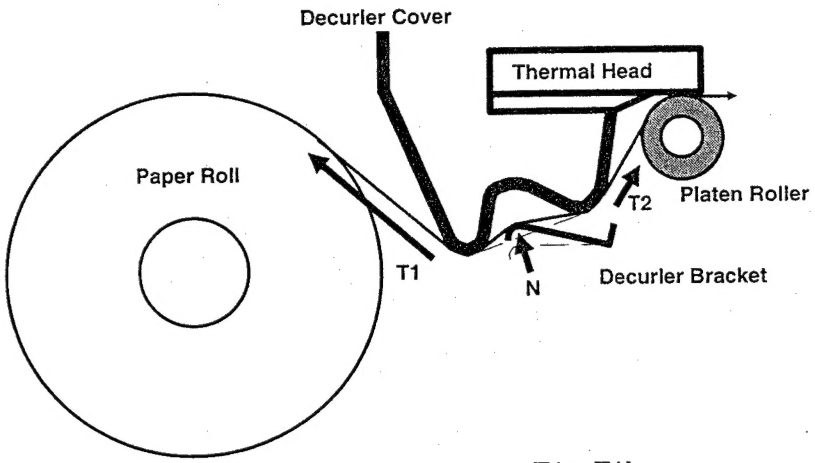
2-1. PFC15/PFC25/PFC35 (Manual Cutter Models)

The printer is very simple. After printing has been finished, the machine feeds the paper 22 mm to the cutting position. So, the received copies will have a 22 mm blank space on the top.

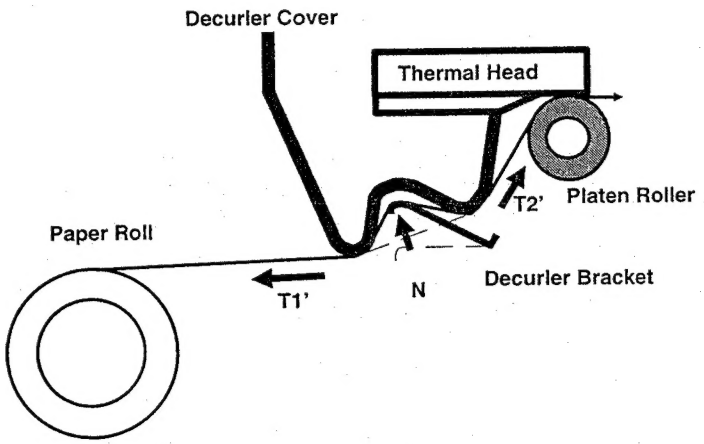
2-2. PFC45 (with Shuttle Cutter and Decurler)

2-2-1. Decurler

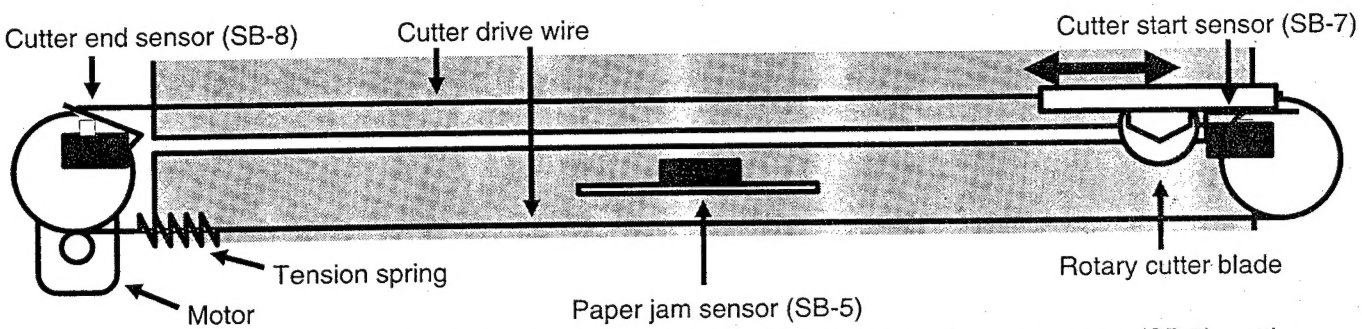
The decurler unit consists of the decurler cover, decurler bracket and the decurler spring on the platen roller shaft.
In standby mode, the decurler bracket is down at the standby position. When the machine starts printing, the decurler spring on the platen roller shaft lifts up the decurler towards the bend in the decurler cover. Then the paper path is curved as shown in the bottom diagram, so that the two bends on the decurler cover can apply negative stress to the curled paper to get rid of the curl from the paper.
The decurler bracket always applies the same negative force (N) to the paper, but the negative stress on the paper varies depending on the amount of paper remaining. The tension (T1) when the roll is almost full is stronger than the tension (T1') when the roll is almost empty, and the tension (T2) equals to (T2').
So, the paper path is curved more strongly as the paper roll gets lighter.
After printing has finished, the machine cuts the paper then reverses the Rx motor to feed back the paper to the printing position and to move the decurler bracket down to the standby position.



T1 > T1'
T2 = T2'
N = N



2-2-2. Shuttle Cutter



The shuttle cutter consists of a paper guide frame, rotary cutter blade, motor, cutting start sensor (SB-7), cutting end sensor (SB-8), and jam sensor (SB-5).
In standby mode, the cutter blade is always at the cutting start position. When the machine has finished printing, the Rx motor stops then the cutter blade shuttles across the paper. The cutting end sensor detects that the cutter blade has finished cutting, then the CPU reverses the cutter motor to move the cutter blade to the cutting start position. After cutting, the Rx motor feeds out the copy, then it reverses to feed the paper back to the printing position and to move the decurler bracket down to the standby position.